Draft Environmental Assessment

Chandler Road (Dryad) Bridge Replacement

Lewis County
FEMA-1734-DR-WA

December 2009

FEMA

U.S. Department of Homeland Security
FEMA Region X
130 228th Street SW
Bothell, WA 98021-9796

Prepared for:

U.S. Department of Homeland Security
FEMA Region X
130 228th Street SW
Bothell, WA 98021-979
Contact: Mark Eberlein (425) 482-487-4735; mark.eberlein@dhs.gov

Prepared by:

EDAW AECOM
710 Second Avenue, Suite 1000
Seattle, WA 98104

October 2009
(with additional edits by FEMA)

Contents

Appendices

Tables

Figures

Acronyms and Abbreviations

APE	Area of Potential Effect
AoA	Analysis of Alternatives
BMPs	Best Management Practices
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
cfs	cubic feet per second
CMP	Corrugated metal pipe
CWA	Clean Water Act
cy	cubic yard
EA	Environmental Assessment
Ecology	Washington State Department of Ecology
EFH	Essential Fish Habitat
EO	Executive Order
EPA	U.S. Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FONSI	Finding of No Significant Impact
fps	feet per second
FR	Federal Register
GMA	Growth Management Act
HPA	Hydraulic Project Approval
LCC	Lewis County Code
MBTA	Migratory Bird Treaty Act
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NTU	Nephelometric turbidity unit
OHWM	Ordinary High Water Mark
PHS	Priority Habitats and Species
RCW	Revised Code of Washington
RM	River Mile
ROW	Right-of-way
RPW	Relatively Permanent Water
SCS	Soil Conservation Service
SEPA	State Environmental Policy Act
SHPO	State Historic Preservation Office
SMA	Shoreline Management Act
SMP	Shoreline Management Program
SPCC	Spill Prevention Countermeasure Control
SR	State Route
STP	shovel test pit

TESC	Temporary Erosion and Sediment Control
TNW	Traditional Navigable Water
TS&L	Type, Size, and Location
USACE	U.S. Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
USGS	U.S. Geological Survey
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
WDNR	Washington Department of Natural Resources
WQI	Water Quality Index
WRIA	Water Resource Inventory Area
WSDOT	Washington State Department of Transportation

1.0 Purpose and Need for Action

1.1 INTRODUCTION

The Department of Homeland Security's Federal Emergency Management Agency (FEMA) proposes to provide partial funding to the Lewis County Public Works Department (Lewis County) for the repair of the Chandler Road bridge crossing over the Chehalis River, near Dryad, Washington. The bridge was swept away by the Chehalis River during storms in December 2007. The President declared a federal disaster for the state on December 8, 2007, because of severe storms, flooding, landslides, and mudslides, making funds available to the region for disaster recovery assistance.

To restore access and minimize the risk of similar damage during future storms, Lewis County proposes to relocate the bridge crossing upstream of a sharp bend in the river where the original bridge was located and raise the elevation of the bridge deck. Relocating the bridge crossing would require realigning the approach roadways. Raising the elevation of the bridge deck would require grade and related adjustments to the approach roadways to match the elevation of the new bridge deck. Lewis County evaluated several bridge structure and alignment options, and developed 50 Percent Design Plans (HHPRI 2009b) for the Preferred Engineering Alternative, which is used as the basis for the analysis presented in this document.

The Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1973 (Stafford Act), as amended, provides federal assistance programs for both public and private losses sustained in disasters. FEMA provides assistance to private citizens, public entities, and non-profit groups following declared disasters.

1.2 AUTHORITY AND JURISDICTION

The National Environmental Policy Act (NEPA) of 1969 requires FEMA to evaluate the effects of the potential alternatives of a proposed action on the human and natural environments. Two alternatives for the Chandler Road (Dryad) Bridge Replacement project are compared in this Environmental Assessment (EA): a No Action Alternative and the Proposed Action.

The NEPA EA process allows FEMA to determine whether to issue a Finding of No Significant Impact or a Notice of Intent to prepare an Environmental Impact Statement, which is required under NEPA for federal actions that may have a significant effect.

1.3 PURPOSE AND NEED

The purpose of FEMA's Public Assistance program is to assist communities in recovering from damages caused by natural disasters by providing federal funding for repairs to restore public property and facilities to their pre-disaster condition or function. The need for the project is to restore access via Chandler Road to areas on the north side of the Chehalis River that was disrupted by the destruction of the Chandler Road bridge crossing from storms and subsequent floods in December 2007. Residents and others used the Chandler Road bridge crossing to travel between State Route (SR) 6 and the Dryad area. With the loss of the bridge, residents and emergency services

must travel up to approximately 6 to 10 additional miles because of the destruction of the Chandler Road bridge crossing.

1.5 LOCATION AND BACKGROUND

The project site is located approximately 17.5 miles west of the city of Chehalis, Washington, via SR 6 in rural Lewis County, Washington. The unincorporated community of Dryad is located approximately 0.5 miles to the north of the project site via Chandler Road, and the unincorporated community of Doty is located approximately 1.5 miles to the northwest of the project site via SR 6 or Doty Dryad Road. The legal description of the project site is Township 13 North, Range 5 West, and Section 12 (see Figure 1.5-1, *Vicinity Map*). The coordinates are 46.630833^{o} North and -123.251389^{o} West.

The proposed project corridor extends north/northeast from SR 6 (just east of mile post 38) across the Chehalis River (just east and downstream of river mile [RM] 98) to meet up with Chandler Road on the north side of the river. The project corridor extends along approximately 250 additional linear feet of Chandler Road on the north side of the river. South of the river, the project corridor extends east and west to encompass adjoining segments of Doty Dryad Road (see Figure 1.5-2, *Project Site*). Land ownership along the project corridor includes county roads and right-of-way (ROW), and rural residential property.

The proposed project corridor is located in the Chehalis River valley and within the active floodplain of the Chehalis River. South of the Chehalis River, the project corridor traverses undeveloped portions of private rural residential between SR 6 and Doty Dryad Road. This area includes two nonfish intermittent tributaries to the Chehalis River, a small freshwater riparian wetland, upland riparian forest, and unmowed fields dominated by reed canarygrass (*Phalaris arundinacea*). From Doty Dryad Road, the project corridor crosses the Chehalis River, including narrow bands of upland riparian habitat along its shorelines. North of the Chehalis River, the project corridor extends along Chandler Road and encompasses portions of adjacent private property, including previously disturbed upland riparian habitat to the west, and private rural residential yards to the east.

Prior to the December 2007 storms and subsequent flooding, Chandler Road crossed the Chehalis River from the south from SR 6 via a bridge located on the downstream end of a significance bend in the channel. The original bridge was a triple-span structure supported by two end abutments and two sets of piers. The main span was 78 feet long with a 36-foot wide deck. The bridge was aligned approximately perpendicular to flow with the right (south) abutment located at the apex of the bend in the river channel. The approach embankment of the southern abutment protruded into the river, causing a restriction.

Figure 1.5-1. Vicinity Map
[GIS map; 8.5x11 color; see separate compiled figures]

Figure 1.5-2. Project Site
[GIS map; 8.5x11 color; see separate compiled figures]

This area experienced significant amounts of scour during the December 2007 storm event. Riprap was present along the base of the upstream face of the southern abutment, but it and the abutment

were destroyed during the storm. The original bridge was also affected by large amounts of woody debris that collected in the support piers and in the bridge rail during flooding.

1.6 SCOPING AND ISSUE SUMMARY

1.6.1 SCOPING

FEMA initiated the NEPA scoping process by sending out a scoping notice on September 1, 2009, to agencies and interested parties. The scoping letter explained the NEPA process and the proposal for relocating and replacing the Chandler Road bridge crossing. The purpose of the scoping process was to inform agencies and stakeholders about the proposed project and allow the public, agencies, and Tribes to provide comments regarding the scope of the project, the proposed alternatives, and any issues of concern that should be considered in the NEPA EA. The scoping letter afforded recipients 30 days to provide comments and the two letters received are included as Appendix A. The public involvement process is fully described in Section 4 (*Consultation and Coordination*).

The two responses received by FEMA during the scoping period are summarized below in Table 1.6-1.

Table 1.6-1. Summary of Public Scoping Response Issues.

Agency/Individual	Issue or Comment Summary	Response in this EA
Marvin and Diana McCloud, Jr.	Concerned regarding perceived extent of potential right-of-way acquisition of their property – 1/3 of parcel.	Land use issues are addressed in Section 3.1, *Land Use*.
Sarah Lukas, Ecology	• Effects on riparian habitat • Ability of new project to sustain 100-year flood levels • Compliance with federal, state, and local regulations	Riparian impacts are addressed in Section 3.4, *Vegetation and Wetlands*. Flood design is addressed in Section 2 and Section 3.3, *Hydrology, Water Quality, and Floodplains*. Regulatory compliance is addressed throughout Section 3, by resource topic.

1.6.2 SUMMARY OF ISSUES

FEMA identified a number of issues that need to be addressed in this EA. Based upon a preliminary screening of resources in the project area, this EA includes an analysis of the following resources:

- Land use
- Geology, soils, and shoreline stability
- Hydrology, water quality, and floodplains
- Vegetation and wetlands
- Fish and wildlife
- Transportation and access
- Environmental justice
- Cultural resources
- Cumulative effects

The following resources were evaluated during the screening process, and it was determined that these resources would not be affected by the project: recreation, visual quality, air quality and noise, and topography. Thus, these resource areas are not covered further in this document.

1.7 RELATED ACTIVITIES

The December 2007 storms caused extensive flooding and damage in the region. Other damage to transportation infrastructure and access along the Chehalis River in Lewis County included similar damage to the nearby Leudinghaus Road Bridge #87 (Mays Bridge) crossing, and a bridge crossing from SR 6 used to access Rainbow Falls State Park (shown on Figure 1.5-1, *Vicinity Map*, for context and comparison). These projects are being addressed separately and are unrelated to the Chandler Road Bridge repair effort.

2.0 Alternatives, Including the Proposed Action

The following sections describe the alternatives that are being considered for the Chandler Road Bridge Replacement project, and the process that was used to develop these alternatives. Two alternatives are analyzed: the No Action Alternative and the Proposed Action.

2.1 ALTERNATIVES DEVELOPMENT

Prior to the development and identification of the NEPA alternatives, four bridge structures and four horizontal approach roadway options were evaluated as engineering alternatives for replacing the Chandler Road bridge crossing over the Chehalis River in a Type, Size, and Location (TS&L) study prepared by Kramer Gehlen Associates for Lewis County (KGA 2008). Of the four bridge structure options evaluated in the TS&L study, Option 1 (Single-Span Precast Post-Tensioned Spliced Girder Bridge) was selected as the Preferred Bridge Structure Option and carried forward for analysis as the Preferred Engineering Alternative (i.e., the Proposed Action) in this EA. Additional information on the various engineering options initially considered is presented in Section 2.4, *Alternatives Considered but not Carried Forward*.

The two alternatives analyzed in detail in this EA include the Proposed Action and the No-Action Alternative, as described below.

2.2 ALTERNATIVES CONSIDERED BUT NOT CARRIED FORWARD

Several alternatives were reviewed but eliminated from further consideration in this EA because they did not meet the project purpose and need, they were not practical, or they were not applicable to FEMA funding under its Public Assistance program. As noted above, four bridge structures and four horizontal approach roadway options were initially evaluated as engineering alternatives for replacing the Chandler Road bridge crossing over the Chehalis River in the TS&L study prepared by (KGA 2008). Option 1 was selected as the Preferred Bridge Structure Option and carried forward for analysis in this EA. The three bridge structure options eliminated from further consideration include the following:

- **Eliminated Bridge Structure Option 2: 3-Span Deck Bulb-T Girder Bridge –** Eliminated Option 2 is a 240-foot long, 3-span bridge structure with two intermediate piers. The elevation of the bridge deck is 310 feet with 3 to 6 feet of freeboard. This bridge structure option would require permanent drilled shaft foundations in or near water and additional temporary access roadway for construction equipment. Although similar in cost ($1,600,000) to the Preferred Option ($1,550,000), the 3-span bridge structure option is considered less optimal than the Preferred Option (a single-span bridge structure with no intermediate piers) because of potentially high scour and impact loading from debris.

- **Eliminated Bridge Structure Option 3: Single-Span Steel Truss Bridge –** Option 3 is a 240-foot long, single span bridge structure with no intermediate piers. The elevation of the bridge deck is 306 feet with 3 to 10 feet of freeboard. This bridge structure option would require no in-water work and has no significant structural constraints (such as the intermediate piers under Option 2). However, construction of this bridge type is more labor

intensive than the other options and requires more maintenance, significantly increasing the cost; the estimated cost of this bridge structure option is $2,290,000.

- **Eliminated Bridge Structure Option 4: Single-Span Steel Tied Arch Bridge –** Option 4 is a 240-foot long, single-span bridge structure with no intermediate piers. The elevation of the bridge is the same as for Option 3, at 306 feet with 3 to 10 feet of freeboard. This bridge type has a more complicated construction than the other options, and like Option 3, requires more maintenance, and is significantly more costly than the Preferred Option. The estimated cost of this option is $2,500,000.

The TS&L study evaluated the four bridge structure types and roadway alignments for aesthetics, cost, geometric constraints, construction impacts, foundations, hydraulics, structural constraints, and maintenance. Aesthetics were not considered to be a primary consideration. Bridge structure cost estimates for the KGA TS&L study were based on general case square foot costs provided in the Washington State Department of Transportation (WSDOT) Bridge Design Manual (WSDOT 2008), which considers location, foundation type, in-water work, span length, and constructability. Preliminary approach roadway costs were developed to account for the large range in deck elevations associated with the different structure types. A project concept cost for the construction of each bridge structure type and approach roadway alignment was developed that included mobilization costs and contingency.

The bridge design is restricted by geometry and bound by the 100-year flood elevation and 3-foot freeboard below, and the adjoining roadway approaches. The distance from bank to bank of the Chehalis River at the project site is approximately 220 to 230 feet. The increased elevation of the bridge deck would require grade adjustments and related improvements (e.g., drainage, retaining walls) to the adjoining roads. There is a 4x6-foot concrete box culvert that outlets to the Chehalis River on the south side, approximately 250 feet west of the original bridge site. The invert elevations are about 20 feet below Doty Dryad Road, and any increases in elevation would require retaining walls.

Northwest Hydraulics (2008) estimated the 100-year water surface elevation at 300 to 301 feet at the original Chandler Road bridge location. This stage is above the river channel banks, but about 3 feet below the December 2007 peak stage. The 100-year flow is above the existing banks, and the overflow areas are relatively large, so the water surface elevations would not change significantly if small amounts of fill are placed within the current waterway. The 2-year flow, which roughly represents the ordinary high water mark (OHWM), is approximately 285 feet at Chandler Road (Northwest Hydraulics 2008). Additionally, the original bridge was affected by large amounts of woody debris that had collected against the bridge structure during storm flows. Given the amount of woody debris (including large woody debris) still available in areas that drain to the Chehalis River, it is anticipated that large amounts of woody debris would be transported to the proposed bridge site in future floods of the Chehalis River. Piers constructed in the channel have a high probability of catching woody debris during future flood events. Thus, it was imperative to develop a design that raised the structure to ensure the long-term integrity of the bridge.

Four roadway alignment options were originally developed as part of the TS&L study (KGA 2008):

- **Alignment Option 1 –** This roadway alignment option involves aligning the bridge crossing so that the southern abutment is located west (upstream) of the 4x6 foot culvert outlet to the Chehalis River on the south side of the river. This alignment would locate the bridge crossing upstream of the bend in the river where the original bridge crossing was located. The southern approaches would utilize the existing Doty Dryad Road alignment, but would require elevating the grade of the road to meet the elevation of the bridge deck. The intersection of Doty Dryad Road with SR 6 would be moved to the west and Chandler Road would no longer exist on the south side of the river. The intersection would become a two-way rather than a three-way intersection. The northern Chandler Road approach would be realigned slightly to the west of its current location to line up with the new bridge crossing, and improvements would be necessary to a private driveway located just north of the bridge approach on the east side. This option was selected by Lewis County as the preferred roadway alignment, and carried forward for further development

- **Alignment Option 2A –** This roadway alignment option involves aligning the bridge crossing so that the southern abutment is located to the east (downstream) of the 4x6 foot culvert outlet to the Chehalis River on the south side of the river. This alignment would locate the bridge slightly within the river bend, near its upstream end. The southern approaches would utilize the existing Doty Dryad Road alignment; however, significant regrading of Doty Dryad Road would be necessary between SR 6 and the new bridge for the eastern approach to meet the elevation of the new bridge deck. This option was eliminated because Lewis County determined that the grades required to intersect with SR 6 would be too severe because of the height of the bridge structure and the grade of SR 6. Additionally, hydraulic conditions are not optimal with the bridge at this location.

- **Alignment Option 2B –** This roadway alignment option places the bridge crossing on the same alignment as Option 2A. However, the southern approach roadways would be different. Under Option 2B, the new bridge would be accessed from SR 6 via a new Chandler Road alignment located to the west of the current Chandler Road/SR 6 intersection, and the existing portion of Doty Dryad Road between SR 6 and the bridge would be decommissioned. Like Option 2A, this option was eliminated because Lewis County determined that the grades required to intersect with SR 6 would be too severe because of the height of the bridge structure and the grade of SR 6. Additionally, hydraulic conditions are not optimal with the bridge at this location.

- **Alignment Option 3 –** This roadway alignment option replaces the bridge crossing in its original location. The approach roadways would be restored to their original configuration with necessary regrading to meet the elevation of the new bridge deck. Like Options 2A and 2B, this option was eliminated because Lewis County determined that the grades required to intersect with SR 6 would be too severe because of the height of the bridge structure and the grade of SR 6. Additionally, hydraulic conditions are not optimal with the bridge at this location.

Of the four roadway alignment options developed as part of the TS&L study, Option 1 was selected to carry forward in the Analysis of Alternatives (AoA) prepared by Harper Houf Peterson Righellis (HHPRI 2009). The AoA consists primarily of various alignments for the southern approach. The northern approach (Chandler Road) remains the same as originally developed under Option 1 (described above). The AoA included five options for the southern approach. Of these, Option 3 was selected as the Preferred Roadway Alignment Option and carried forward for analysis in this EA. The four roadway alignment options eliminated from further consideration included:

- **Eliminated Southern Approach Alignment Option 1 –** This option involves shifting the Chandler Road/SR 6 intersection west of its original location, and realigning that portion of Doty Dryad Road approaching the bridge from the west slightly to the south to create a new Doty Dryad/Chandler intersection. Doty Dryad Road to between the new bridge and SR 6 would be decommissioned. This option was eliminated because Lewis County determined that the angle of the intersection between Doty Dryad Road and Chandler Road was too acute (pers. comm., Muggoch 2009a).

- **Eliminated Southern Approach Alignment Option 2 –** This option involves the same new Chandler Road/SR 6 intersection as Option 1, but the Doty Dryad Road realignment to connect with the new Chandler Road segment between SR 6 and the bridge would be slightly different. This option was eliminated because Lewis County determined that the Doty Dryad/Chandler Road intersection, which would be situated over Stream 1, would require too long of a culvert structure beneath the intersection to convey the water (pers. comm., Muggoch 2009a). Additionally, this option would result in greater ROW impacts, involving more private property owners, than the Preferred Option.

- **Eliminated Southern Approach Alignment Option 4** – This option is similar to Options 1 and 2. However, the new Chandler Road alignment between SR 6 and the new bridge would be shifted farther west than under the previous two options, resulting in a slightly different Doty Dryad/Chandler Road intersection. This option was eliminated because Lewis County determined that the ROW impacts would be too great in comparison to other options. Additionally, more trucks use Chandler Road than Doty Dryad Road, and this option would require an extra stop, which is not preferable (pers. comm., Muggoch 2009a).

- **Eliminated Southern Approach Option 5** – Unlike Options 1, 2, and 4, this option does not include a new Chandler Road alignment and intersection with SR 6. Under this option, the approach roadways to the bridge would utilize the existing Doty Dryad Road alignment only, with regrading and associated road improvements to raise the roadway to meet the elevation of the new bridge deck. Chandler Road would no longer exist south of the river. This option was eliminated because of the amount of structural earth walls it would require associated with raising the grade of Doty Dryad Road between the new bridge location and SR 6 (pers. comm., Muggoch 2009a).

The Preferred Engineering Alternative carried forward for analysis in this EA consists of the Single-Span Precast Post-Tensioned Spliced Girder Bridge (Bridge Structure Option 1) and Roadway Alignment Option 1 with the revised Southern Approach Alignment Option 3. The Preferred Bridge Structure and Preferred Roadway Alignment options comprise the Preferred Engineering Alternative

that would be funded by the Proposed Action, and are described in detail under Section 2.4 (*Alternative B – Proposed Action*).

2.3 ALTERNATIVE A - NO ACTION ALTERNATIVE

NEPA requires the analysis of the No Action Alternative, against which the effects of the "action alternatives" can be evaluated and compared. Under the No Action Alternative, FEMA would not provide funding for repair of the Chandler Road bridge across the Chehalis River. Access between SR 6 and the Dryad area on the north side of the river via a bridge crossing of Chandler Road would remain in its current disrupted state indefinitely. This would require the use of longer alternative routes, as described in detail in Section 3.6 (*Transportation and Access*).

Under the No Action Alternative, Lewis County could choose to move forward with restoring the Chandler Road bridge crossing on its own accord (or, for example, with additional financial assistance from other sources, such as the State of Washington); however, any such activities would not be funded by FEMA.

2.4 ALTERNATIVE B - PROPOSED ACTION

Under the Proposed Action, FEMA would provide funding to the Lewis County Public Works Department to restore the Chandler Road bridge crossing over the Chehalis River, near Dryad, Washington. The Proposed Action includes design and construction related to a new bridge structure and approach roadways, including bridge approach embankments, retaining walls, culverts, fills, and new pavement. The bridge would restore access to residences on the north side of the Chehalis River in the project area to its pre-disaster condition. The design, construction, and long-term maintenance of the project would comply with applicable rules and regulations and would require Lewis County to adhere to state and federal regulations regarding best management practices (BMPs) for construction. Construction would not occur when weather and/or ground conditions would cause excessive erosion. Construction would minimize effects on wildlife and sensitive habitats. Clearing of vegetation for the project would be kept to a minimum to reduce habitat disturbance.

The following description of the elements of the proposed project, construction activities, BMPs, project timing, and project costs are based upon the following materials:

- Bridge No. 55 and No. 87 Rehabilitation Project 100 Percent Review Plan Set (HHPRI 2009a).
- 50 Percent Review Plan Sheets for the Realigned Chandler Road (HHPRI 2009b).
- 90 Percent Review Grading, Drainage and Erosion Control Plan Sheets for the Realigned Chandler Road (HHPRI 2009c).
- A description of the Chandler Road Bridge Construction provided to EDAW AECOM by Lewis County (2009a).
- Excavation and fill quantities within the 100-year floodplain and the Ordinary High Water Mark (OHWM) of the Chehalis River provided to EDAW AECOM by Lewis County (2009b).
- E-mail correspondence between Linda Howard (EDAW AECOM) and Keith Muggoch (Lewis County Public Works Department) July-September 2009 (pers. comm., Muggoch 2009).

2.4.1 PROJECT ELEMENTS

The proposed project involves the following (as illustrated in Figure 1.5-2):

(1) Shifting the Chandler Road intersection with SR 6 and Doty Dryad Road (previously a three-way intersection) west of its existing location;
(2) Constructing a new alignment of Chandler Road from SR 6 north then northeast to Doty Dryad Road; and
(3) Constructing a new clear span bridge structure from Doty Dryad Road across the Chehalis River to meet up with Chandler Road on the north side of the river

The new Chandler Road bridge would be located approximately 300 feet west of the original bridge site, upstream of a bend in the Chehalis River and west of the existing 4x6 foot concrete box culvert through which Stream 1 flows into the Chehalis River. The proposed bridge structure is a single-span precast post-tensioned spliced girder bridge supported on cast-in-place concrete stub abutments, and founded on 4-foot diameter drilled shafts. The elevation of the bridge deck would be at 313 feet and the bridge would have a final clear span of 235 feet.

The scope of work and construction design criteria presented in this Draft EA may change to some extent during final approval of the 100 Percent Design for the project. This will depend largely upon whether additional permitting and conservation measures are required for project approval by local, state and federal laws and regulations.

2.4.2 CONSTRUCTION ACTIVITIES

Construction activities associated with the construction of the proposed bridge structure would include the installation of a temporary work platform and a temporary construction road to the work platform; temporary pier supports; construction of drilled shafts, bridge abutments, and placement of girders; riprap placement; installation of a false deck for construction workers; and construction of the bridge deck. Construction of the new bridge would require excavation and fill within the 100-year floodplain elevation and within the OHWM (i.e., the 2-year floodplain elevation). Table 2.4-1 lists the estimated quantities of excavation and fill by location and material type.

Table 2.4-1. Quantities of Excavation and Fill within the 100-year and 2-year Flood Elevation of the Chehalis River for Construction of the Chandler Road Bridge Replacement Project.

Description / Location	Unit	Material Type	Quantity		
			Structural	Road	Total
Approximate quantity of excavation within the 100-year flood elevation	CY	Not classified	984	189	1,173
Approximate quantity of excavation within the OHWM (2-yr flood elev.)	CY	Not classified	250	0	250
Approximate quantity of material placed within the 100-year flood elevation, separated as to type of material	CY	Concrete	110	0	110
	CY	Structural fill	287	0	287
	CY	Riprap	728	0	728
	CY	Common or gravel borrow	0	2,343	2,343

Description / Location	Unit	Material Type	Quantity		
			Structural	Road	Total
Approximate quantity of material placed within the OHWM (2-yr flood elev.) separated as to type of material	CY	Concrete	0	0	0
	CY	Structural fill	0	0	0
	CY	Riprap	250	0	250
	CY	Common or gravel borrow	0	0	0
Approximate area of project limits	Acres		2.21		

CY=cubic yard
All quantities shown in this summary table are raw quantities, and have not been adjusted. Quantities are based on the 90% progress plan set, and are subject to revision.
Source: Lewis County 2009b

The temporary platform would be approximately 28 feet wide and would extend from the south bank to the northern temporary support pier of the bridge, approximately 110 feet into the river channel. The platform would be located on the downstream side of the new bridge structure and would likely be constructed using steel piles, steel frame, and timber blocking. The steel piles would be driven into the riverbed using a pile driver. Access to the temporary work platform would be from the south, from Doty Dryad Road. A construction road would be built with quarry spalls from the road to the platform. The road would need to be at least 18 feet wide to accommodate large track-mounted cranes. The temporary construction road may require construction traffic to cross the existing Stream 1 outfall to the river. In this case, a culvert sized to pass summer flows would be installed and covered with gravel. The temporary construction road and any associated culverts would be removed once construction activities requiring them are completed.

The project plans do not specify methods for in-water pile installation, such as the type of pile driver that would be used (impact vs. vibratory), or whether bubble curtains would be used. However, Lewis County has stated that they do not anticipate the need for cofferdams (pers. comm., Muggoch 2009). The construction contractor would be responsible for developing in-water pile installation methods. All in-water activities, including pile driving, would be required to comply with regulatory permit requirements.

The drilled shafts would be constructed at the same time the temporary work platform and temporary pier supports would be constructed. An oscillator would most likely be used to excavate material that would be disposed of at an approved location. The construction contractor would be responsible for determining the location of disposal sites for waste materials from the project (pers. comm., Muggoch 2009b). All waste disposal sites would be required to be permitted and approved by Lewis County (pers. comm., Muggoch 2009b). Water encountered during excavation of the drilled shafts would be collected and allowed to settle, and be filtered if necessary, then returned to the Chehalis River. After the drilled shafts are constructed, the abutments would be constructed. Heavy loose riprap would be placed up- and downstream of the bridge abutments on both sides of the river and keyed in at each location to reduce the potential for scour in these areas. Riprap is generally placed prior to girder installation because equipment access is much easier.

Once the temporary support piers are constructed, the girders would be set using a large track-mounted crane, assisted by an additional crane. After the girders are placed and braced, the false

deck for construction workers would be constructed and the diaphragms would be built. The false deck would prohibit construction materials from falling into the river. The next step would be the construction of the bridge deck. Once the deck is cured, post-tensioning of the girders would take place, and then the temporary support piers would be removed, along with the temporary work platform and trestle. All materials placed in the river would be removed at this time. It is estimated the temporary work platform would need to remain in the river approximately 2 months until the girders are post-tensioned.

The design elevation of the new bridge would require raising the existing grade of the adjoining roadway approaches along Doty Dryad Road and Chandler Road, and would include a new Chandler Road alignment from SR 6 to Doty Dryad Road on the south side of the river. The existing segments of Chandler Road on the south side of the Chehalis River and Doty Dryad Road east of the new Chandler/Doty Dryad intersection would be decommissioned. The final construction sequence has not yet been determined, and would be developed by the contractor. It is anticipated that work on the approach roadways would begin once the bridge girders are set. However, construction of the structural earth walls may occur at the same time.

Construction activities associated with the proposed approach roadways include clearing and grubbing of existing vegetation within the clearing limits of the proposed new alignment; saw-cutting existing pavement at the point-of-connection where new roadway or roadway improvements would occur; pulverizing and removing existing asphalt within the project limits prior to the placement of fill; grading; placement of fill, base, top course, and asphalt for the new and reconfigured approach roadways and the new bridge approaches; and the construction of retaining walls, drainage ditches, and outfalls. Structural earth retaining walls would be constructed along portions of Chandler and Doty Dryad roads. Structural earth retaining walls along Doty Dryad Road would be constructed on both the north (river) side and south side of the roadway.

The new Chandler Road alignment on the south side of the Chehalis River from SR 6 to Doty Dryad Road would be located to the west of Stream 2 and would cross Stream 1. Construction of the new roadway in this area would include the installation of a 140-foot long, 66-inch diameter corrugated metal pipe (CMP) culvert on Stream 1, just upstream of its confluence with Stream 2. It is anticipated that culvert installation would occur during the summer months during low-flow conditions. The fill embankments for the new road prism would overlap the lower portions of Stream 2 and its confluence with Stream 1. This segment of Stream 2 would be diverted approximately 20 linear feet to meet up with the downstream end of the new 66-inch diameter CMP installed on Stream 1. Stormwater runoff from the new impervious surfaces in this area would drain to ditches constructed at the base the roadway embankments and would drain to Stream 1. Runoff not forming concentrated flow would continue as sheetflow onto revegetated embankments. The proposed project would include the construction of new riprap aprons at the existing upstream and downstream headwalls of the existing concrete box culvert on Stream 1 beneath Doty Dryad Road.

On the north side of the river, the Chandler Road approach would be realigned and regraded to match the elevation of the new bridge deck. Construction activities associated with the realignment of Chandler Road on the north side of the river include the realignment and reconstruction of roadside ditches and the installation of a new culvert beneath the roadway. The roadside ditches and

new culvert would outfall directly to the Chehalis River. A 10-foot long pad of riprap flush to the flow line would be hand placed for the full width of the ditch at each outfall.

Construction is anticipated to include standard construction equipment such as track-mounted excavators, dozers, backhoes, dump trucks, concrete trucks, double drum rollers, paving machines, in addition to smaller tool trucks and hand tools. A pile driver would be required to install steel piles associated with the temporary work trestle, and cranes would be used for bridge construction activities.

2.4.3 BEST MANAGEMENT PRACTICES

Temporary and permanent best management practices (BMPs) would be implemented as part of the proposed project to minimize effects on natural resources, including ground and surface waters. BMPs would include, but not be limited to, the following: limiting the area of disturbance to the amount necessary for construction of the project, and implementing a Spill Prevention Countermeasure Control (SPCC) Plan and a Temporary Erosion and Sediment Control (TESC) Plan. Temporary and permanent erosion and sediment control measures would be implemented to control erosion at the project site both during and after construction of the project and to prevent sediment from entering ground or surface waters. Temporary erosion control measures may include, but not be limited to, the following: the use of straw bales, check dams, and silt fencing. After construction, all disturbed areas would be revegetated and/or hydroseeded with an approved seed mixture.

2.4.4 PROJECT TIMING

Construction of the bridge and approach roadways is anticipated to take place from May to November 2010, a duration of approximately 7 months (pers. comm., Muggoch 2009a). If weather is too wet, paving may be delayed until the following spring (Lewis County 2009a). This estimated construction timeframe is dependent upon acquiring funding and the appropriate permits for construction of the project. All in-water work must meet work window requirements established in the permitting process.

2.4.5 PROJECT COSTS

The current estimated cost of the project is estimated at $2,899,243 ($1,550,000 for the bridge structure). Preliminary engineering and construction engineering costs are anticipated to total approximately $500,000, and ROW acquisition costs are anticipated to total approximately $100,000. The total project cost is estimated to be approximately $3,499,243 (pers. comm., Muggoch 2009a).

2.5 ALTERNATE PROJECT AND EXECUTIVE ORDER 11988

FEMA's agency guidelines for conducting a practicable alternatives analysis include the preparation of an eight-step checklist (44 Code of Federal Regulations [CFR] Part 9) to determine proper floodplain management in compliance with Executive Order (EO) 11988. The completed checklist for the Chandler Road (Dryad) Bridge Replacement project is included as Appendix B, and the potential effects on floodplains are described in Section 3.3 (*Hydrology, Water Quality, and Floodplains*). Based on the results of the analysis, there are no identified practicable action

alternatives to locating the project in the Chehalis River floodplain. The No Action Alternative is a practicable alternative to locating the project in floodplains, but The No Action Alternative would not meet the purpose and need for the project, which is to restore access between the south and north sides of the Chehalis River in the Dryad area.

2.6 SUMMARY OF EFFECTS

Table 2.6-1 provides a summary of the effects described and analyzed in Section 3 (*Affected Environment and Environmental Consequences).*

Table 2.6-1. Summary of Effects of the No Action Alternative and Proposed Action.

Resource Area	Alternative A – No Action Alternative	Alternative B – Proposed Action
Land Use	No effects.	No effects on land use at a landscape level. 3.21 acres of proposed ROW acquisition, including substantial reduction in parcel size on two private property parcels (32 – 76%); moderate reduction in size on two additional parcels (16-17%); and minor reduction in size on two more parcels (5-7%). Minor adverse effects on several parcels due to encroachment of new approach roadways.
Geology and Soils	No effects.	Temporary construction-related impacts: • Potential for minor amounts of erosion and sedimentation from soil-disturbing activities near streams and the Chehalis River. Standard erosion and sediment control BMPs would be implemented to minimize these effects. Disturbed areas would be revegetated once construction is completed. • Pile driving associated with construction of temporary work platforms would disturb sediments in the Chehalis River channel. Pile driving in-water would comply with Washington Department of Fish and Wildlife (WDFW) Hydraulic Project Approval (HPA) permit requirements, which typically include measures to minimize potential adverse effects.
Hydrology, Water Quality, and Floodplains	No effects.	Temporary construction-related impacts: • Potential for water quality effects from accidental spills or contaminated runoff; soil disturbance near streams and river; in-water work; temporary mobilization of fine sediment in surface water. These effects would be minimized to a less-than-significant level with the implementation of standard erosion and sediment control BMPs and TESC and SPCC plans and compliance with permit requirements. Long-term impacts: • Installation of the new bridge and protective riprap would cause less than a 0.01-ft increase in elevation of the 100 year flood stage and negligible increases in bank velocities at this flood stage.
Vegetation and Wetlands	No effects.	Permanent removal of: • 0.38 acres of riparian forest • 0.75 acres of riparian grassland
Fish and Wildlife	No effects.	Temporary construction related impacts: • Potential effects on fish from pile driving activities in the Chehalis River. Pile driving in-water would comply with WDFW HPA permit requirements. • Construction activities may cause fish and/or wildlife to avoid the

Resource Area	Alternative A – No Action Alternative	Alternative B – Proposed Action
		project area during construction. • Construction activities may cause harmful materials to enter the river. This would be minimized with the implementation of the SPCC and TESC plans. Permanent effects: • Culvert 140 linear feet of Stream 1 • Alter/divert 20 linear feet of Stream 2 • Convert 28,000 square feet of riparian habitat to road
Transportation and Access	Significant adverse effects. Loss of important transportation infrastructure and routes for indefinite period of time. Requires project area residents, workers, and emergency service providers to use longer alternative routes. Lack of bridge crossing at Chandler Road has resulted in an average 15-minute increase in emergency response times in the area.	No significant adverse effects. Minor adverse effects from slowing traffic to one private driveway access due to closer location of realigned Chandler Road/SR 6 intersection. Significant long-term beneficial effect through the replacement of important transportation infrastructure and restoration of transportation routes.
Environmental Justice	No effects.	No effects.
Cultural Resources	No effects.	No effects.

3.0 Affected Environment and Environmental Consequences

3.1 LAND USE

This section describes existing land use and ownership in the project study area, applicable regulations pertaining to land use, and the potential effects of the project alternatives, including the No Action Alternative and the Proposed Action.

3.1.1 AFFECTED ENVIRONMENT

This section includes a description of existing land use in the vicinity of the project site.

3.1.1.1 Land Use in and adjacent to the Project Study Area

The project study area is located in Lewis County, Washington, on remote rural land currently zoned as Agricultural Resource Lands (Lewis County 2009c). Agricultural Resource Lands in Lewis County are primarily devoted to the commercial production of agricultural products (Lewis County 1999, as amended). However, based on site visit observations, none of the land within or immediately adjacent to the project study area is currently being used for these purposes. Much of the project study area encompasses existing public roads and ROW owned by the County, including Doty Dryad Road and Chandler Road, while the remainder encompasses portions of private property parcels adjacent to SR 6, Doty Dryad Road and Chandler Road. See Figure 3.1-1, *Land Use*.

Privately owned property includes narrow bands of riparian forest situated on the steep south bank of the Chehalis River, between the river and Doty-Dryad Road. These areas have no developed uses.

Private property on the south side of the Chehalis River between Doty Dryad Road and SR 6 includes riparian forest around two streams and a small riparian wetland, and unmowed fields dominated by reed canarygrass. An old, dilapidated structure covered in vegetation (possibly an old home site) is located in the eastern portion of this area, near the existing Doty Dryad/Chandler/SR 6 intersection. To the west, this area extends into mowed portions of fields nearer to residences.

North of the Chehalis River, between Chandler Road and the river, the project site includes a riparian area that was once an old mill site. Much of the area is now covered in riparian forest, with open patches covered in grasses and weeds. East of Chandler Road, the project site encompasses portions of residential driveways and yards in front of the residences.

3.1.1.2 Surrounding Land Uses

The project site is bordered by SR 6 to the south, and additional Agricultural Resource Land located on the relatively flat terrain of the Chehalis River valley to the north, east, and west. These lands consist of scattered rural residences, large open fields, and forested areas. Some fields in the project vicinity may be used for hay production. The Willapa Hills Trail, formerly a Northern Pacific Railroad, runs east-west approximately 0.5 miles north of the project site. This trail is the only managed public land use in the project vicinity other than roadways.

Figure 3.1-1. Land Use
[aerial map with overlays; 8.5x11 color; se separate compiled figures]

3.1.2 ENVIRONMENTAL CONSEQUENCES

This section describes the potential effects of the No Action Alternative and the Proposed Action on land use within the immediate vicinity of the project. Mitigation measures to offset any identified effects are also described, as applicable.

3.1.2.1 Regulatory Considerations

Applicable federal, state, and local regulations pertaining to land use in the project study area are described below.

State Environmental Policy Act

The Washington State Environmental Policy Act (SEPA) requires government agencies to consider the environmental consequences of their "actions," as defined in the SEPA rules (Washington Administrative Code [WAC] 197-11-704), on elements of the natural and built environment, including land use. The proposed activity meets the definition of an "action," and is therefore subject to environmental review under SEPA. Lewis County is the lead agency responsible for complying with SEPA. The SEPA environmental review is being conducted separately from this NEPA EA.

Lewis County Comprehensive Plan

Land within the project study area is managed by Lewis County and subject to the Lewis County Comprehensive Plan (Lewis County 1999, as amended) and Land Use and Development Regulations (Lewis County Code [LCC] Title 17). The Lewis County Comprehensive Plan is intended to identify a vision for the community and to allocate and provide for growth consistent with the 13 goals of growth management articulated in the state Growth Management Act. The Land Use Element, updated April 20, 2009, describes the County's existing land uses and provides a broad general direction for land use policy in Lewis County. All lands located outside Urban Growth Areas (UGAs) are considered either resource lands or rural lands. Lands within and adjacent to the project study area are currently designated by the Lewis County as Agricultural Resource Land (AGL) (Lewis County 2009c).

Lewis County Shoreline Management Program

Lewis County adopted its Shoreline Master Program (SMP) in June 1980. The SMP identifies rivers, streams, and lakes that fall within the jurisdiction of the Shoreline Management Act (SMA). In addition, the SMA defines "Shorelines of State-wide Significance." Definitions applicable to shorelines in Lewis County include natural rivers or segments thereof west of the crest of the Cascade range downstream of a point where the mean annual flow is measured at 1,000 cubic feet per section (cfs) or more; lakes with surface area of 1,000 acres or more measured at the OHWM; and associated wetlands. The Lewis County SMP identifies four rivers, including the Chehalis River, as having shorelines of statewide significance (Lewis County 2009c).

3.1.2.2 Threshold of Significance

Significance under NEPA is determined by assessing the effect of a proposed action in terms of its context and the intensity of its effects. Effects related to land use are typically evaluated within the context of their compliance with land use management plans, the potential to require or induce changes in land use zoning, and effects on existing uses. Environmental planners conducted a survey of the study area and vicinity to understand the existing land use setting and to help visualize the project alternatives. Each alternative was then evaluated in terms of its effects on existing land uses. Effects on land use were evaluated for consistency with applicable land use management plans, policies, and regulations, including the Lewis County Comprehensive Plan and Land Use Ordinances. The No Action Alternative and the Proposed Action were determined to result in a significant effect on land use if they would:

- Would conflict with applicable land use plans, policies, regulations, or laws; or
- Would involve changes in the existing physical environment that, because of the location or nature, would substantially interfere with existing or designated land uses.

3.1.2.3 Alternative A: No Action

Under the No Action Alternative, FEMA would not provide any funding for repair of the Chandler Road Bridge crossing across the Chehalis River, and there would be no construction or related activities. The No Action Alternative would have no foreseeable effect on existing land uses in the project vicinity. No conflicts would arise with any existing federal or state laws, or management plans, or the Lewis County Comprehensive Plan or Land Use and Development Regulations.

3.1.2.4 Alternative B: Proposed Action

Under the Proposed Action, FEMA would provide partial funding to Lewis County to restore the Chandler Road bridge crossing over the Chehalis River slightly upstream of the original bridge site, as described in Section 2, *Alternatives, Including the Proposed Action*. No conflicts would arise with any existing federal or state laws, or management plans, or the Lewis County Comprehensive Plan or land use and development regulations. The Proposed Action would have no significant impacts on land use from a landscape level perspective. The effects of the Proposed Action are primarily related to ROW acquisition of private property within the construction footprint of the project and encroachment of the elevated roadways on adjacent occupied parcels (effects on private driveway access are described in Section 3.6, *Transportation and Access*). These effects would be permanent, and would be significant for specific individual parcels and minor for others.

Right-of-way Acquisition

The proposed new ROW area includes portions of six separate parcels, totaling approximately 3.21 acres. Table 3.1-1 summarizes the proposed ROW acquisition impacts by private property parcel. As Table 3.1-1 shows, the Proposed Action would require the acquisition of greater than two-thirds of the Baker parcel. This parcel is located on the south side of the Chehalis River between SR 6 and Doty Dryad Road, and would be occupied by the new Chandler Road approach. This parcel is the site of an old dilapidated homestead, but is currently unoccupied and has no other apparent developed uses. Furthermore, its location between SR 6 and Doty Dryad Road and the two streams running through it (Streams 1 and 2) limits its potential uses. The effect on this parcel would be

permanent and significant with regards to a reduction in size, but there would be little effect on local community land use.

Table 3.1-1. Proposed ROW Acquisition Impacts on Private Property Parcels.

Parcel No.	Property Size before Acquisition (acres)	ROW Acquisition (acres)	Parcel Size after Acquisition (acres)	Percent of Parcel Acquired
20031000000 – Baker	1.35	1.03	0.32	76%
20050001000 – McCloud	1	0.07	0.93	7%
200500000000 – Osborn	4	0.21	3.79	5%
020046000000 – Boardman (south bank)	1	0.32	0.68	32%
020025004000- Boardman (north bank)	8.85	1.48	7.37	17%
020025011000 – Le Master	0.64	0.1	0.54	16%
New ROW Acquisition Total		**3.21**		

Source: Lewis County 2009d. Percent of total parcel acquired computed by EDAW AECOM.

The Proposed Action would also require a substantial portion (one-third) of one of the Boardman parcels. This parcel is located directly between Doty Dryad Road and the Chehalis River on the south side and abuts the top of the steep river bank. This parcel has no apparent developed use, and the elongated shape and location of the parcel limit its potential uses. The effect on this parcel would be permanent and significant with regards to a reduction in size, but there would be little effect on local land use. The other Boardman parcel on the north bank of the river would incur a permanent and moderate reduction in size. The Boardman parcel on the north bank also has no apparent developed use, and its position between the river and Chandler Road limits its potential future uses. Impacts on this parcel would have no effect on local land use.

The Le Master parcel, located on the north side of the Chehalis River east of Chandler Road, would incur a moderate reduction in size (16 percent). This is a rectangular-shaped property, with its short end abutting Chandler Road. This parcel currently has no built structures and is not occupied. The effect on this parcel would be permanent; however, it is anticipated that it would still have potential as a rural homesite, similar to the adjacent properties.

Two parcels, the McCloud and Osborn parcels, would have minor reductions in size (5 to 7 percent) and would incur minor effects on existing and potential future uses of the parcels. Under the Proposed Action, the new Chandler Road alignment between SR 6 and Doty Dryad Road would abut the eastern edge of the McCloud parcel, which is occupied, as opposed to the current condition, where it is separated by the unoccupied Baker parcel. The new alignment would not encroach closely upon built structures or active use areas on this property as observed during site visits; however, it is reasonable to anticipate that the presence of the new roadway alignment would inhibit

future active or passive uses of the property near the roadway. Additionally, the raised elevation of the new Chandler Road alignment south between SR 6 and Doty Dryad Road would create a berm at the eastern edge of the McCloud parcel, altering the visual aspect of the surrounding landscape from this property. The road prism of the western approach of Doty Dryad Road would also be widened and the grade raised to match the bridge. The widened Doty Dryad Road would encroach upon auxiliary structures on the occupied Osborn parcel on the south side of Doty Dryad Road, but would not encroach upon the residence or immediately surrounding areas. Auxiliary structures nearest the proposed ROW acquisition area as observed during site visits appeared to be relatively old farm sheds and are in a dilapidated state. ROW acquisition and road encroachment on the Osborn parcel is not anticipated to interfere with current uses on the property, but could have minor effects on passive uses. As with the McCloud property, the elevated roadway would alter the visual aspect from the property. The elevated Chandler Road approach from the north would have similar minor effects on the visual aspect from adjacent parcels on the north side of the river.

Mitigation Measures and Residual Effects

NEPA requires the identification of reasonable mitigation to alleviate the environmental effects of a proposed action. Under the Proposed Action, Lewis County would be required to fairly compensate property owners for acquisition of their property for the project in accordance with applicable regulations. Coordination with property owners regarding ROW acquisition and agreements regarding compensation generally occur during the ROW acquisition phase of a project. No additional mitigation measures are proposed separate from this process.

Significant and Unavoidable Adverse Effects

The Proposed Action would have no significant effects on land use at a landscape scale. As described above, two specific individual parcels would incur permanent and substantial reductions in size (32 – 76 percent). However, these parcels are currently undeveloped and have no apparent existing uses, and their locations limit potential future uses. Therefore, these effects are not considered to be significant from a community land use perspective. Two parcels would incur permanent and moderate reductions in size (16 – 17 percent). One is currently undeveloped, and its location limits potential future uses; although reduced in size, the other is anticipated to still be viable as a rural homesite similar to surrounding properties. Two parcels would incur permanent minor reductions in size (5-7 percent), which would have minor effects on existing use of the properties.

3.2 GEOLOGY, SOILS, AND SHORELINE STABILITY

3.2.1 AFFECTED ENVIRONMENT

The following narrative describes the geology, soils, and shoreline stability of the project area, and the effects of the Proposed Action and No Action Alternative.

3.2.1.1 Geology

The geology of the Upper Chehalis River basin, like most of the Willapa Hills physiogeographic region, is dominated by Oligocene-Eocene marine sedimentary rocks from the Lincoln Creek Formation. During the earliest Columbia River Basalt Group Flows (approximately 17 million years

ago), the Willapa Hills were uplifted, forming the dominant north-south ridgelines of the area. Many local surface geology features were formed during multiple dynamic Pleistocene glacial advances and retreats, followed by the formation of the present-day Chehalis River bed (Wells 1981), with evidence of recurrent glacial and riverine shaping of the landscape apparent along SR 6 and the Chehalis River banks. Sandstone and tuffaceous siltstone underlay extensive alluvial deposits and intrusive basalt in the project area (Lasmanis 1991, HHPRI 2008). Multiple fault lines occur throughout the Willapa Hills as a result of the complex geologic history of the area, although none are within or near the project area (WDNR 2008). A prehistoric mass-wasting deposit is located directly south, outside of but adjacent to the project area (WDNR 2008). Along the Chehalis River valley, slumping and mass wasting are common; highly erodible lithologies and heavy seasonal precipitation combine to create a landscape prone to mass-wasting and landslides. The Chehalis River channel and its associated floodplain are primarily weathered quaternary alluvial deposits of variable depth that sometime extend more than 60 feet below the surface. Greater detail about the geology of the area can be found in the *Report of Geotechnical Engineering Services for Lewis County Bridge Replacement Chandler Road Bridge # 55…* (HHPRI 2008).

3.2.1.2 Soils

The Lewis County Area Soil Survey (SCS 1987) maps include three soil types in the project study area, listed in Table 3.2-1. Cloquato silt loam forms the Chehalis riverbed and both banks of the river in the north portion of the study area. Reed silt loam is mapped underlying Stream 1; however, the substrate of Stream 1 is basalt rock. Chehalis silt loam underlies the southern portion of the study area, including the road prism for SR 6. Although Chehalis and Cloquato soils are well drained, these soils contain trace inclusions of hydric soil types in depressions, along stream corridors, and near the bases of slopes.

Table 3.2-1. Mapped Soils in the Dryad/ Chandler Road Bridge Project Study Area.

Soil Number - Name	Soil Classification	Taxonomy	Drainage Class	Significant Hydric Inclusions?
61 Cloquato Silt Loam	Non- Hydric	Ultic Haploxerolls	WD	Alvor, Puget, Reed (<1% each)
172 Reed Silt Loam	Hydric	Vertic Argiaquolls	PD	1% Alvor
47 Chehalis Silt Loam	Non-Hydric	Ultic Haploxerolls	WD	Alvor, Reed (<1% each)

WD: well drained; PD: poorly drained.
Source: SCS 1987.

3.2.1.3 Shoreline Stability

The Chehalis River is essentially free flowing upstream of the Newaukum River confluence, 30 miles downstream of the project site. Shorelines are deep silts and sands that are easily transported downstream, and shorelines are naturally unstable because of the highly erodible nature of the parent soils and lack of flow attenuating structures, such as large woody debris, riparian vegetation, and landscape-scale management of the floodplain for shoreline and river stability. Significant flooding in the Chehalis River has reshaped the shoreline and relocated large quantities of sediments, soils, and large woody debris, in part motivating the need for this project (see Section 1, *Purpose and Need for Action*). The marine-sedimentary parent soils forming the bed and banks of the Chehalis

River and Stream 2 are highly erodible, and will continue to wear in response to both seasonally high precipitation typical of the local climate, and the variable flow volumes and velocities native to flashy, storm event driven systems like the Chehalis (Massong and Montgomery 2000). The bed of Stream 1 is basalt; however, the banks and riparian soils are also marine sedimentary soils. Lower in the watershed, many small dikes and levees created from dredging materials have historically stabilized the river banks (USACE 1990), although recent and repeated flooding events have overwhelmed and destroyed many of these flood control systems.

3.2.2 ENVIRONMENTAL CONSEQUENCES

Potential effects of the No Action Alternative and the Proposed Action on geology, soils, and shoreline stability within the immediate vicinity of the project are described here. Mitigation measures to offset any identified adverse effects are listed, as applicable.

3.2.2.1 Regulatory Considerations

No specific regulations directly target geological and soil resources within the study area; however, several state and federal regulations apply to shorelines and soils in so far as these affect erosion and sedimentation processes.

Section 404 of the Clean Water Act

Section 404 of the Clean Water Act regulates dredge and fill activities in "waters of the U.S.," including the Chehalis River and Streams 1 and 2. All activities that would result in dispersal of materials to waters of the U.S., such as activities that cause sedimentation or increased erosion, would require compliance with the terms of the U.S. Army Corps of Engineers (USACE) Section 404 permit, described in Section 3.4 *Vegetation and Wetlands*.

Shoreline Management Act

The Shoreline Management Act (Revised Code of Washington [RCW] 90.58) regulates shorelines, including associated erosion and sedimentation concerns in Washington state, and is described further in Section 3.3 *Hydrology, Water Quality, and Floodplains*, and Section 3.4 *Vegetation and Wetlands*.

Washington State Hydraulic Code (Chapter 77.55 RCW)

The Washington Department of Fish and Wildlife (WDFW) administers Hydraulic Project Approval (HPA) permits. These are often granted with restrictions requiring certain methods be used or other standards be met for erosion and sedimentation, as well as regulating vegetation in and near water and establishing in-water work windows.

3.2.2.2 Threshold of Significance

Each alternative was evaluated for its potential effects on the surface geology, soils, and shoreline stability of the site. An action was determined to result in a significant effect on these resources if the project:

- Would result in soil erosion rates substantially greater than current levels;

- Would result in the accumulation of sediment in aquatic habitats above current rates; or
- Would affect shoreline stability or stabilizing vegetation at the shoreline.

Details of each alternative for the bridge structure, roadway alignment, and bridge approaches are described in Section 2, *Alternatives, Including the Proposed Action*.

3.2.2.3 Alternative A: No Action

Under the No Action Alternative, the FEMA Public Assistance system would not provide funding for bridge construction, and there would be no disturbance to soils, geology, or shoreline stability related to FEMA actions.

3.2.2.4 Alternative B: Proposed Action

The following section describes both temporary and permanent effects associated with the Proposed Action. Detailed descriptions of construction activities for the Proposed Action can be found in Section 2.4, *Alternative B: Proposed Action*, including temporary and permanent structures, timing, and estimates of materials removed and placed within the project footprint.

Temporary effects would be created by both temporary structures and the temporary construction activities necessary to complete the project. Temporary structures would be located on the south side of the Chehalis River and in the river, and would be in place for approximately 2 months. The temporary road and piers would require surface soil disturbance to build the piers, and placement of quarry spalls and gravel to create the necessary surface elevation and access structures during bridge construction. These materials would be removed after construction is complete, and surface soils and vegetation would be allowed to recover through natural processes, or enhanced with riparian plantings if required by permitting.

Soils in the Chehalis River would be modestly affected by pile driving of the piers into the substrate, although vibration pile driving would minimize the area and quality of disturbance, and is therefore preferable to impact pile driving if soil properties will allow it (Warrington 1992). Pile driving in the river is subject to WDFW HPA permitting, which regulates sedimentation and typically requires both primary and secondary sediment containment devices as part of the BMPs. Additionally, the in-water piles may capture, on the upstream end, small amounts of sediment that are normally suspended in the river flow; however, these amounts are not expected to exceed the range of natural sediment accumulation normal to the site.

Construction of the temporary work platform would require temporary alteration of the Stream 1 outfall, requiring an extension of the culvert of the outfall. Fill material would be placed over the culvert as part of the temporary construction road access; this work would fall within the OHWM of the Chehalis River. Increased erosion is not anticipated from these temporary structures; however, small quantities of riparian vegetation may be removed or buried, and sedimentation from loose fill material may occur during storm events. BMPs to minimize erosion and sedimentation would be applied, including a TESC Plan, and replanting of any removed riparian vegetation may be required to comply with the WDFW HPA permit or other state or federal permits.

Permanent effects are those that would remain in place throughout the life of the road and bridge. Permanent effects associated with the Proposed Action include the removal of approximately 15,000 square feet of vegetation for the road realignment, 840 square feet of sparse riparian vegetation removed south of the OHWM of the Chehalis River and the edge of Doty Dryad Road, and 28,000 square feet of riparian vegetation at Streams 1 and 2. Removal of these areas of vegetation would result in negligible surface soils disturbance; during construction, however, the potential for streambank erosion would be high for the brief period that bank soils are exposed before compaction, fill, and construction took place. Construction of the project would have the potential to mobilize soils that could then be carried to surface water during storm events.

Specific strategies required as part of local, state, and federal permits to minimize erosion and sedimentation during construction include, but are not limited to: (1) limiting ground disturbance (clearing, grubbing, grading) to that essential for construction of the project; (2) timing construction activities that expose large areas of soil to occur during the dry summer or early fall months when the threat of erosion due to storm events is minimal; and (3) incorporating erosion control measures such as mulching, seeding, and/or planting.

Lewis County would follow all local, state, and federal permit requirements for erosion control, mitigation of riparian vegetation, and in-water work sedimentation control, and would implement standard BMPs for all aspects of construction throughout the project.

Mitigation Measures and Residual Effects

No additional mitigation measures are proposed for geology or soils. Shoreline stability may benefit from restoration of riparian vegetation at the site of the old bridge alignment, to include riparian conifers, deep-rooted native shrubs, and large woody debris. Riparian vegetation and opportunities for restoration and enhancement available on site are described in more detail in Section 3.4, *Vegetation and Wetlands.*

Significant and Unavoidable Adverse Effects

No unavoidable or significant adverse effects on soils, geology, or shoreline stability would result from the proposed project.

3.3 HYDROLOGY, WATER QUALITY, AND FLOODPLAINS

3.3.1 AFFECTED ENVIRONMENT

3.3.1.1 Drainage Area and Climate

The Chehalis River basin, located at the southern end of the Puget Trough, has a total drainage area of approximately 2,114 square miles including tributaries. The 115-mile long Chehalis River begins at the confluence of the West Fork Chehalis River and East Fork Chehalis River, in the Cascade foothills in southwestern Lewis County. The Chehalis River valley occupies most of the northern, northwestern, and western portions of the county. The valley is characterized by a broad, well-developed floodplain, with low terraces surrounded by highly dissected uplands of low to moderate relief, that have broad, rounded ridges drained by numerous perennial streams. Elevations within the basin range from 170 feet at Chehalis to more than 5,000 feet at the headwaters, although most

uplands in the basin average 300 to 600 feet in elevation. The river is steep from its source to the floodplain, with an average gradient of 16 feet per mile (0.3 percent).

The receiving water for the Chehalis River is the Grays Harbor estuary at Aberdeen, Washington. Because of the low elevation headwaters, snowpack is not a factor in Chehalis River flooding, although the river is extremely prone to flooding from heavy precipitation events that regularly occur during the fall and winter. The average annual rainfall in the project vicinity is 60 to 70 inches (Lewis County 2008a). The warmest months in Lewis County are typically July and August, with monthly mean temperatures of approximately 65°F. The coldest month of the year is January, when average monthly temperatures usually reach 39°F. The average annual temperature for the region ranges between 50 and 53°F. The greatest amount of rainfall in Lewis County occurs between the October and March, with November having the highest monthly average (Lewis County 2004).

3.3.1.2 Site Hydrology

The project site is located at RM 98 of the Chehalis River, within the 25,348-acre Hope Creek Watershed, a subwatershed within the Upper Chehalis Water Resource Inventory Area (WRIA) 23, which is one of 62 major watersheds in Washington state delineated for planning purposes under the state's Water Resources Management Program. WRIA 23 comprises the southeastern portion of the Chehalis River basin. Tributaries to the Chehalis River in the project vicinity include Capps Creek, Absher Creek, Dunn Creek, and Marcuson Creek (Figure 3.3-1). The South Fork Chehalis River is located approximately 10 miles downstream. Two small intermittent tributaries, called Stream 1 and Stream 2, are located in the project area.

The Chehalis River passes through a large bend at the project site and has a relatively incised main channel (Figure 3.3-2); on average, the streambed is 25 to 30 feet lower than the floodplain. Both river banks climb steeply to the upland plain, which is dominated by deciduous and evergreen forest vegetation, with significant amounts of agricultural and open space land use and sparse residential developments. The elevation of the left (north) road approach fill is approximately 300 feet above sea level (North American Vertical Datum of 1988) near the proposed bridge, but tapers up to the natural floodplain elevation approximately 2,000 feet north of the bridge. The original bridge had two intermediate pilings that each consisted of two 3-foot diameter piers. These tended to collect woody debris, which constricted the bridge opening.

Figure 3.3-1. Project Area Hydrology.
[8.5x11; color; GIS; see separate compiled figures]

The bed material upstream of the bridge site consists primarily of sandy/silty deposits, but downstream the channel is lined mainly with bedrock (Northwest Hydraulics 2008). A culvert carries flow from a stream outflow southwest of Doty Dryad Road to its continuation north of the road where it drains to the river (HHPRI 2008).

The overbank vegetation at the project site includes mature deciduous and evergreen trees, a significant source of woody debris. Large quantities of woody debris were piled up on the banks in the vicinity of the bridge, and significant amounts were lodged in the bridge rail by the December 3, 2007 flood that destroyed the bridge. Riprap that was present along the base of the upstream face of the right abutment was destroyed along with the abutment. Portions of the riprap, with a median

diameter of approximately 1.5 to 2 feet, are visible in the channel as far as 30 to 40 feet downstream. The channel in the project area is generally stable both laterally and vertically, although some minor erosion did occur along the right bank at the bridge crossing during the flood, where the river channel bends, directing the force of water toward the bank. The channel banks are covered with mature stands of trees upstream and downstream of the bridge site, suggesting that the banks have remained stable for many years (Northwest Hydraulics 2008).

Figure 3.3-2. Aerial photo of bridge site just after being washed out.
Direction of flow is from left to right. Photo from Lewis County Dept. of Public Works' Contract Provisions and Plans for Bridge No. 55 and 87 Demolition and Removal Project. (Figure taken from Northwest Hydraulics 2008.)

The nearest continuously operating stream gage in the project vicinity is U.S. Geological Survey (USGS) Gage 12020000 on the Chehalis River near Doty, at RM 101.8 approximately 3.5 miles upstream of the project site and 26 miles upstream from the city of Chehalis. It records flow received from a 113-square-mile drainage area.

As Table 3.3-1 indicates, the Chehalis River is often subject to extreme fluctuations in flow. Mean monthly flows range from a low of 46 cfs in August to 1,310 cfs in December. Low-level flooding is predicted to occur at a gage height of 11.6 feet at this station (Lewis County 2004). Maximum daily mean stage values have equaled or exceeded this during the months of January, February, April, November, and December, based on available data from 1987 to 2008. During the December 3, 2007, flood event, the average daily mean flow was 55,000 cfs, and 63,000 cfs was the instantaneous peak flow recorded (USGS 2008). The project site is within the 100-year floodplain, as shown on Figure 3.3-3.

Figure 3.3-3. FEMA FIRM Map.
[8.5x11; color; GIS; see separate compiled figures]

Table 3.3-1. Discharge Statistics (in cfs) at USGS Gage 12020000 Chehalis River near Doty, Washington. [1]

Parameter	Date	Discharge
Annual Mean		577
Highest Annual Mean	1956	911
Lowest Annual Mean	2001	253
Highest Daily Mean	December 3, 2007	55,000
Lowest Daily Mean	September 3, 1992	50
90th Percentile		1,460
50th Percentile		257
10th Percentile		36
100-Year Peak Flow [2]		39,000
2-Year Peak Flow [2]		9,900

Source (unless otherwise noted): USGS 2008.
1. Based on Water Years 1940 – 2008.
2. From Northwest Hydraulics 2008.

Two intermittent streams (Stream 1 and Stream 2) are tributaries to the Chehalis River in the project area. Stream 1 flows directly into the Chehalis River from the west via a 4x6 foot concrete box culvert that passes under Doty Dryad Road on the south side of the river (see Figure 1.5-2). The scour zone defining the OHWM and riverine habitat averages 8 feet in width. In the project area, the streambed is comprised of exposed and algae-covered bedrock with scattered fine silt and small cobble overburden interspersed with a few small silt-laden pools. There are no low-lying or floodplain surfaces along the channel, which has moderately incised cut banks approximately 1 to 3 feet tall.

Stream 2 is a relatively linear intermittent stream that flows into the Chehalis River via Stream 1(see Figure 1.5-2). Stream 2 enters the study area through an 18-inch concrete pipe culvert beneath SR 6, then flows north into Stream 1. The scour zone defining the OHWM averages 18 inches in width. It has a bed comprised of deep, fine sediment and incised banks that average 8 inches in height. The majority of Stream 2 in the project area is confined by abrupt tall banks.

3.3.1.3 Surface Water Quality

The Washington State Department of Ecology (Ecology) has developed four major water quality classes: Class AA (extraordinary), Class A (excellent), Class B (good), and Class C (fair), each with specific water quality standards for physical, chemical, biological, and aesthetic parameters. The section of the river between Rock Creek and the Newaukum River (RM 75.2) where the project is located has been designated Class A (Chapter 173-201A WAC). Four ambient water quality monitoring stations have been established on the Chehalis River to assess and characterize surface waters and ensure compliance with the applicable water quality standards protective of beneficial uses, described in Section 3.3.2 (*Environmental Consequences*) below. Water quality measurements of temperature, dissolved oxygen, fecal coliform bacteria, pH, turbidity, suspended sediment,

specific conductivity, and nutrients are periodically taken at each of the monitoring stations. This reach is not on the 1998 303(d) list (Ecology 2009), the most recent water year data available.

The closest station to the proposed project site is the Water Quality Monitoring Station 23A160 Chehalis River at Dryad, at RM 97.8. To aid in the interpretation of water quality results, Ecology developed a water quality index (WQI) system whereby a unitless numeric value is calculated for each water quality parameter listed above and an overall WQI value encompassing all of these parameters. The indices are based on measurements recorded at the monitoring station (Lewis County 2004). The WQI may not be consistent with the Ecology 303(d) listing because WQI and 303(d) analyses use different data sources, different constituents, different time periods, and different evaluation techniques (Ecology 2009).

Monitoring results from monthly grab samples have been converted to WQI scores ranging from 1 to 100 following the methodology described in Ecology (2002). Scores less than 40 indicate that water quality did not meet expectations or was poor. Scores of 40 through 79 indicate moderate quality, and scores of 80 and greater indicate that water quality met expectations and is good. Based on recent water quality data from Monitoring Station 23A160, water quality in this reach generally meets the Class A criteria. The Station 23A160 overall WQI value for 2008, the most recent water year, is 54, adjusted for flow. Individual WQI values for 2008 are: fecal coliform bacteria (80); oxygen (55); pH (93); suspended solids (41); temperature (49); total persulfate nitrogen (72); total phosphorus (44); and turbidity (48). The trend in overall WQI scores from 1993 to 2008 (adjusted for flow) is shown on Figure 3.3-4 (Ecology 2009).

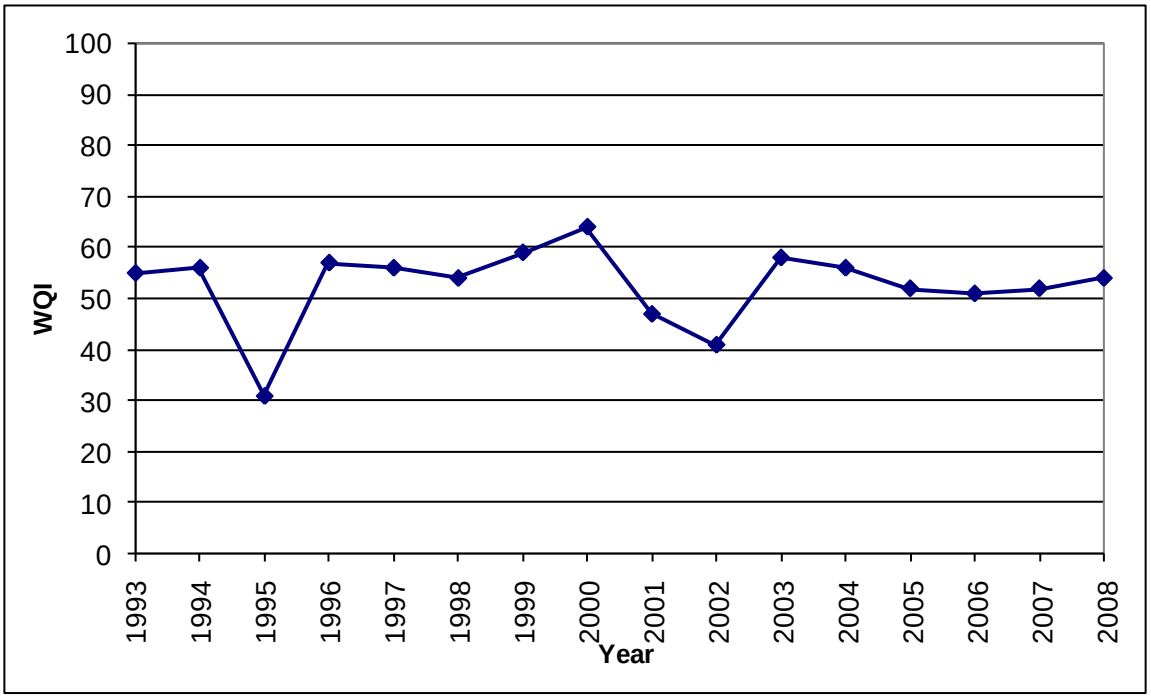

Figure 3.3-4. Overall WQI Scores for Monitoring Station 23A160, Adjusted for Flow.

3.3.1.4 Groundwater Hydrology and Quality

The Chehalis River forms a valley approximately 1 mile wide in the project vicinity. Most residences in the area are located in the valley bottom and utilize onsite domestic wells and individual septic systems (Lewis County 2008b). The project area is a moderate to high groundwater recharge area (Lewis County 2008a). Groundwater flow in the area appears to follow ground surface topography, with flow from the higher elevations toward the valley bottom. In general, groundwater in the valley bottom parallels the direction of river flow, eastward in the project area, and ultimately discharges to the Chehalis River. In Doty, groundwater elevations show an apparent depression, indicated by the closed 275 feet below ground surface (bgs) elevation contour, which may be an artifact of elevation errors or the result of pumping drawdown from the relatively large number of domestic wells in this area.

Groundwater quality in the project area is generally good. Some groundwater areas in Doty and Dryad are contaminated with coliform, although the contamination appears to be limited to shallow groundwater near land surface. Deeper wells in these areas are affected by coliform at far lower rates than the shallow wells, which implies that shallow groundwater may be contaminated with coliform from septic systems or floodwaters in these areas. Nitrate concentrations in the groundwater are generally low, an indication that loading from septic systems is not contributing significantly to groundwater utilized by domestic wells in the project area (Lewis County 2008b).

3.3.2 ENVIRONMENTAL CONSEQUENCES

Potential environmental consequences of each alternative on hydrology, water quality, and floodplains are considered from regulatory and ecological perspectives.

3.3.2.1 Regulatory Considerations

Clean Water Act, Section 401

Section 401 of the Clean Water Act (CWA) requires applicants proposing projects with a federal nexus to obtain certification for activities that could result in the discharge of pollutants into waters of the U.S. Certification is obtained from the state where the discharge originates. Therefore, all projects that have a federal component and may affect the quality of the state's waters must also comply with CWA Section 401. In Washington, Ecology is tasked with granting CWA 401 certification, and also certifies that applicants meet all state requirements under RCW 90.48.260. Section 404 of the Clean Water Act is described under Section 3.4 (*Vegetation and Wetlands*).

Clean Water Act Section 303

Under federal law, the U.S. Environmental Protection Agency (EPA) has published water quality regulations under 40 CFR. Section 303 of the CWA requires states to adopt water quality standards for all surface waters of the U.S. As defined by the CWA, water quality standards consist of two elements: (1) designated beneficial uses of the water body in question, and (2) criteria that protect the designated uses. Where multiple uses exist, water quality standards must protect the most sensitive use. The beneficial uses for the section of the Chehalis River between Rock Creek and the Newaukum River (RM 75.2), where the project site is located, are water supply; stock watering; fish migration; fish and shellfish rearing, spawning, and harvesting; wildlife habitat; primary contact recreation; commerce; and navigation.

Executive Order 11988 (Floodplain Management)

EO 11988 (Floodplain Management), established in May 1977, addresses floodplain issues related to public safety, conservation, and economics. It generally requires federal agencies constructing, permitting, or funding a project to:

- Avoid incompatible floodplain development.
- Be consistent with the standards and criteria of the National Flood Insurance Program (NFIP).
- Restore and preserve natural and beneficial floodplain values.
- Involve the public in the decision-making process for floodplain activities.
- Evaluate effects, both by the floodplain and on the floodplain.

Depending on the nature of the project, federal regulations under EO 11988 require that federal agencies (in this case, FEMA) identify and evaluate practicable alternatives to locating the proposed action in the floodplain. According to the regulations, if a practicable alternative exists outside the floodplain, FEMA must locate the action at the alternative site unless the importance of the project outweighs the directive of EO 11988 to protect floodplains. In the context of this EA, FEMA has considered this practicable alternative analysis in concert with the NEPA requirement of examining potential alternatives to the Proposed Action.

Lewis County Regulations and Standards

The project is subject to Lewis County stormwater management regulations (LCC Chapter 15.45), which contain design criteria and guidelines for temporary (i.e., construction) and permanent stormwater management including performance standards for source control, runoff treatment, streambank erosion control, and erosion and sedimentation control BMPs. LCC Chapter 15.35 "Flood Damage Prevention" contains specific standards for flood hazard reduction, including standards for fill or materials to be deposited within floodplains. No compensation for floodplain storage is required for projects that limit a rise in the base flood elevation to 1 foot or less.

3.3.2.2 Methodology

EDAW AECOM biologists assessed the affected environment through a site visit, characterizing the watershed in field notes and through photo-documentation of notable features. In addition, existing water quality and hydrology information within the proposed project site and surrounding area was gathered from the Lewis County (2008a; 2008b), Northwest Hydraulics (2008), HHPRI (2008), USGS (2008), and Ecology (2009). The analytic approach focused on:

- The level and intensity of effect(s) associated with the proposed bridge restoration;
- Current hydrology, water quality, and floodplains; and
- The potential of any project activities to affect flow rates, paths, and pollutant loads.

In addition, FEMA's agency guidelines include the preparation of an eight-step checklist (44 CFR Part 9) to determine proper floodplain management in compliance with EO 11988.

3.3.2.3 Threshold of Significance

Significance is based on whether discharges to receiving waters would cause exceedances of water quality objectives or have an adverse impact on the beneficial uses identified above in Section 3.3.1.3, *Surface Water Quality*, or would affect hydrology or floodplains pursuant to EO 11988 or Lewis County Code pertaining to stormwater management (LCC Chapter 15.45). The No Action Alternative and the Proposed Action would result in a significant effect on hydrology, water quality, or floodplains if they would:

- Violate any water quality standards or waste discharge requirements, create or contribute runoff water that would provide substantial additional sources of polluted runoff, or otherwise substantially degrade water quality;
- Result in a substantial net loss of the 100-year floodplain; or
- Alter the existing drainage pattern of the project site in a manner that would result in substantial erosion or siltation on or off the site, resulting in flooding on or off the site.

3.3.2.4 Alternative A – No Action

Under the No Action alternative, hydrology and water quality at the site would not be altered from existing post-washout conditions. It is likely that some erosion would continue, particularly during high-flow events, along the right bank at the bridge crossing where the river channel bends, directing the force of water toward the bank and where minor erosion occurred during the December 2007 flood. The old bridge site would likely remain a minor sediment source to the river for the foreseeable future as the riverbank and portions of the old roadbed continue to erode. This would be considered a minor, long-term adverse effect on water quality. There would be no effect from Alternative A on hydrology or floodplains.

3.3.2.5 Alternative B – Proposed Action

The following narrative provides a summary of the proposed project effects under specific sub-headings of water quality, hydrology, and floodplains. Anticipated effects of the Proposed Action include both temporary (construction related) and permanent effects.

Water Quality

Temporary Effects

Construction adjacent to the Chehalis River has the potential to increase soil mobility and increase turbidity in surface waters, adversely affecting water quality. Removal or disturbance of riparian vegetation could cause increases in water temperature and sedimentation, and potential changes in stream morphology resulting from sediment input. Construction activities would directly disturb soils and surface drainage courses adjacent to or within the wetted perimeter of the project area. Potential stormwater discharges of construction-related contaminants could occur. Although the Chehalis River is a naturally high-sediment system, excavation, grading, and fill operations within the floodplain would cause temporary increases in turbidity and/or sedimentation over background conditions.

The water quality standard for turbidity is based on the amount of increase over background conditions. For Class A streams, if background turbidity is 50 nephelometric turbidity units (NTU)

or less, then the total amount of increase cannot be more than 5 NTU. If the background is greater than 50 NTU, then the increase cannot be above 10 percent of the background level (Chapter 173-201A WAC). The project contractor will take the necessary precautions to attain these standards. Construction, stormwater, and erosion BMPs will ensure the protection of water quality in the Chehalis River and the two small tributary streams within the project area.

In-water work needed to construct the temporary platform will be completed during the low-flow period, thus reducing the potential to affect the turbidity levels of the Chehalis River. Precautions will be implemented to ensure that material used for the bridge construction will not fall into the river, that refueling of vehicles or machines is completed at designated areas away from surface waters, and that general construction BMPs to prevent excess erosion and sedimentation from affecting surface waters are implemented and inspected.

Before any construction-related ground disturbance, the project proponent would obtain the necessary permits including, but not limited to Section 401 water quality certification, a National Pollutant Discharge Elimination System (NPDES) Construction Stormwater General Permit, and a WDFW HPA permit. An Erosion and Sediment Control Plan (ESCP) would be designed and implemented for the project. A Spill Prevention Countermeasure Control Plan (SPCC) would be implemented by the contractor prior to the start of construction to ensure that all pollutants are controlled and contained, as required by Lewis County. Pursuant to LCC 15.45.120 "Technical References," the latest edition of Ecology's Stormwater Management Manual (Ecology 2005) shall be used as a guideline for determining the adequacy of the submitted plans. BMPs that are specified in Ecology (2005) and those set forth in LCC 15.45 have been pre-approved for use.

Standard erosion control and material capture measures, included with the ESCP and SPCC plans for the project, would prevent materials from reaching waterbodies through all phases of the project, resulting in limited elevations of turbidity or other water quality parameters associated with construction activities above applicable water quality standards (i.e., Chapter 173-201A WAC). These plans would comply with all applicable permits and policies relevant to the project, and would prevent the potential for degradation of water quality associated with construction activities. The increases in turbidity associated with construction would be minor and short term.

Permanent Effects

Changes in runoff patterns and/or increased runoff volume could be caused by the new bridge, added fill, or realigned approach road. While an existing approach road would be decommissioned as part of the reconstruction process, additional impervious surfaces would be created within the new bridge and approach road. Stormwater and drainage measures would be implemented according to Ecology's Stormwater Management Manual (Ecology 2005) and LCC 15.45 guidelines. The County Engineer shall approve the permanent and post-construction BMPs. Stormwater management measures would be designed and implemented that result in runoff peak flows and volumes being similar to or less than those under pre-disaster conditions. Thus, the long-term effect on water quality from construction of the new bridge would be negligible.

Hydrology

Chehalis River Surface Water

Hydraulic modeling of the channel in the vicinity of the bridge was conducted by Northwest Hydraulic Consultants, Inc. utilizing the USACE HEC-RAS modeling system, with stream cross-section geometry from the ongoing update to the Lewis County Flood Insurance Study (Lewis County 2004) and channel geometry surveys both upstream and downstream of the previous and proposed bridge sites (Northwest Hydraulics 2008). The minimum clearance for the 100-year flood flow at the proposed bridge was calculated to be 3.0 feet, compared with -9.1 feet for the original bridge. The average main channel velocity would be 10 feet per second (fps) for the proposed bridge, compared with 11 fps for the original bridge, and the maximum velocity would be 12 fps for the proposed bridge compared with 17 fps for the original. The added riprap along the bank would cause minor, site-specific increases in velocity caused by the new hardened surface compared to the existing rough, eroded river bank. The Northwest Hydraulics hydraulic model did not analyze a specified amount of riprap along the bank but rather compared the old bridge structure hydraulics to those of the new bridge, which would not constrict flow as the original bridge did.

Because the original and proposed bridge structures are not a significant obstruction to flow at the 2-year flood (i.e., a 50 percent chance of occurring in any single year), changes between original and proposed scenarios are relatively minor: a difference of 0.2 feet or less in stage and 0.3 fps or less in velocity, at or upstream of the bridge location. The range in average channel velocity for the study reach does not differ from the original condition, varying between 5 and 7 fps (Northwest Hydraulics 2008). Thus, Alternative B would cause minor changes to flood stage and near-bank velocities in the Chehalis River, which is considered a permanent, minor, long-term adverse effect.

Tributary Surface Waters (Stream 1 and Stream 2)

Stream 1 would be permanently altered by routing 140 linear feet of the stream (0.26 acres) into a culvert, under the constructed roadway. Stream 2 would be realigned for 50 feet within an engineered channel to its new confluence with Stream 1 at a point downstream of the new Stream 1 culvert outlet. While not eliminated, the function of these two streams would be altered. Jurisdictional status of these streams under Section 404 of the Clean Water Act is described in Section 3.4.1.2 (*Wetland and Riverine Habitat*).

Groundwater

Groundwater levels at the project site are anticipated to rise and fall quickly with the adjacent hydrologically connected river level. Perched water is likely to be encountered much of the year overlying the denser site soils and bedrock materials. The back-of-wall drains required for the retaining walls would most likely be the only dewatering systems necessary to address perched water as determined by the project geotechnical report (HHPRI 2008).

Floodplains and Executive Order 11988

Although the bridge would be built above the 100-year flood elevation, the proposed project would result in the excavation of approximately 1,173 cubic yards of material within the 100-year flood zone and would deposit approximately 2,343 cubic yards of fill within the 100-year floodplain, a net increase of 1,170 cubic yards of material.

The debris from the previous bridge site was removed, making the channel wider and more "flow friendly" (pers. comm., Muggoch 2009a). The proposed bridge would result in less than a 0.01-foot rise in the 100-year flood stage over the existing conditions (Northwest Hydraulics 2008). The proposed bridge structure under the Preferred Engineering Alternative would still be subject to potential harm by its location in the Chehalis River floodplain, although the potential for harm to the proposed clear-span bridge would be considerably less than that of the original bridge. Thus, the project would have a long-term, minor adverse effect on the floodplain, but the new bridge would have substantial benefits over the old bridge.

Under EO 11988, the practicability of locating the bridge in the floodplain must be balanced against the practicability of not carrying out the action at all. Given the location of the project relative to the Chehalis River and its floodplain and the purpose and need for the project, which is to restore access between the south and north sides of the river in the project area, no practicable action alternatives have been identified to locating the project (a bridge crossing) within the Chehalis River floodplain. A thorough alternatives analysis process considered other roadway options and a number of design alternates (see Section 2, *Alternatives, Including the Proposed Action*). The Preferred Engineering Alternative (i.e., the Proposed Action) was determined to be the best engineering solution with the least effect on the floodplain of the numerous alternatives analyzed.

Furthermore, the placement of fill required for the Proposed Action would be in compliance with Lewis County Flood Damage Prevention Ordinances (LCC Chapter 15.35.190 "Flood Hazard Reduction") because:

- The fill would have a beneficial purpose, and the amount would not be greater than necessary to achieve that purpose.
- The fill would minimize the net increase in flood levels to less than a 0.01-foot rise in the 100-year flood stage over existing conditions, which is less than the federal (NFIP) standard and the adopted Lewis County Floodplain Ordinance standard of a 1-foot increase in flood levels from the cumulative effect of the proposed development, when combined with all other existing and anticipated development during the occurrence of the base flood discharge. The Proposed Action would not increase the capacity of the local transportation network and is not anticipated to induce additional development within the floodplain in the project area. It would restore support for floodplain development to its pre-disaster condition.

FEMA's agency guidelines for conducting a practicable alternatives analysis include the preparation of an eight-step checklist (44 CFR Part 9) to determine proper floodplain management in compliance with EO 11988. The completed checklist for the Chandler Road Bridge Replacement project is included as Appendix B. The results of the EO 11988 evaluation are summarized below.

The project site is located in the Chehalis River valley, and the proposed new bridge structure would cross the Chehalis River just downstream of RM 98. According to the FEMA Flood Insurance Rate Map (FIRM) panels for the project area (FEMA 1981), the southern and northern portions of the project (the approach roadways) are located in FEMA Flood Zone C, and the central portion of the project (the bridge and immediate approaches) would be located in FEMA Flood Zone A.

FEMA flood zones are geographic areas that FEMA has defined according to varying levels of flood risk. Each zone reflects the severity of the type of flooding in the area. Zone C includes areas located outside of the 100-year floodplain and are considered moderate to low risk areas; Zone A includes areas that are within the 100-year floodplain and are considered high risk areas. FEMA is currently revising the FIRM panels for the project area as follows: Zone C is being reclassified to Zone X. Zone X shaded areas are classified as within the 500-year flood zone. Zone X areas not shaded are outside the 500-year flood zone (pers. comm., Muggoch 2009a). Flooding is a result of heavy or continuous rainfall exceeding the absorptive capacity of soil and the flow capacity of rivers, streams, and coastal areas. This causes a watercourse to overflow its banks onto adjacent lands. Floodplains are, in general, those lands most subject to recurring floods, situated adjacent to rivers and streams.

Given the location of the proposed project within the 100-year flood zone (Zone A) of the Chehalis River, the Proposed Action has the potential to affect floodplains and nearby occupants, and the proposed project is subject to potential harm by its location with the floodplain. These issues were originally considered and evaluated during development of the Preferred Engineering Alternative (bridge type, size, location, and deck elevation; and approach roadway alignment) for the project (see Section 2). Hydraulic modeling used to develop the Preferred Engineering Alternative was based on cross-section geometry from the ongoing update to the Lewis County Flood Insurance Study (Lewis County 2004) and channel geometry surveys both upstream and downstream of the former and proposed bridge sites (Northwest Hydraulics 2008).

Given the location of the project relative to the Chehalis River and its floodplain and the purpose and need for the project, which is to restore access between the south and north sides of the river in the project area, no practicable action alternatives have been identified to locating the project (a bridge crossing) within the Chehalis River floodplain. The No Action Alternative is a practicable alternative to locating the project in floodplains, but The No Action Alternative would not meet the purpose and need for the project, which is to restore access between the south and north sides of the Chehalis River.

The Proposed Action, under which FEMA would provide funding to Lewis County for implementation of the Preferred Engineering Alternative, would have minor adverse effects on floodplains, primarily from fill within the floodplain associated with construction of the new bridge structure. The proposed project would not increase the capacity of the local transportation network and is not anticipated to induce additional development within the floodplain in the project area. It would restore support for floodplain development to its pre-disaster condition. The Proposed Action would have a significant beneficial effect on transportation and access in the area affected by the proposed project by restoring access between SR 6 and the north side of the Chehalis River to its pre-disaster condition. This benefit outweighs the minor unavoidable adverse effects on the floodplain of the project.

Mitigation Measures and Residual Effects

No mitigation is proposed regarding water quality, hydrology, and floodplain effects. Residual effects are described in the preceding narrative.

Significant and Unavoidable Adverse Effects

With the implementation of the BMPs identified above, there would be no significant effects from the project on water quality, hydrology, or floodplains.

3.4 VEGETATION AND WETLANDS

This section describes vegetation communities (including wetlands) potentially affected by the project alternatives, including the Proposed Action and the No Action Alternative. A field survey of the project study area was conducted in July 2009 to gather information regarding existing vegetation and habitat conditions at the site, and included a delineation of wetlands and other waters of the U.S. Wetlands were delineated in accordance with methods described in the USACE Wetland Delineation Manual (Environmental Laboratory 1987) and the Western Mountains, Valleys, and Coast Range Interim Regional Supplement (Environmental Laboratory 2008). The results of the wetland delineation are detailed in a separate wetland delineation report prepared for the project (EDAW AECOM 2009a).

3.4.1 AFFECTED ENVIRONMENT

The project study area encompasses approximately 9.1 acres and includes a variety of cover types: disturbed/developed areas (such as roadways), riverine and wetland habitats, and upland riparian forest and grassland habitats. Figure 3.4-1, *Vegetation Cover Types*, shows the approximate extent of each of these cover types. There are no records of federally listed threatened or endangered plants in the project area, and the generally disturbed nature of the site makes their occurrence highly unlikely.

3.4.1.1 Upland Vegetation

Upland vegetation associated with the Chehalis River and two of its tributaries (Streams 1 and 2) consists of 1.92 acres of riparian forest and 1.4 acres of grassland (see Figure 3.4-1). Riparian forest and grassland habitats described below generally occur above an elevation of 286 feet above mean sea level in the Chehalis River channel; which corresponds with the approximate 2-year flood level. The upland portions of the study area also include 1.64 acres of rural residential development and 2.05 acres of existing Lewis County roads including Chandler Road and Doty Dryad Road; 0.45 of the 2.05 acres includes a portion of Doty Dryad and Chandler Roads Road that will be decommissioned as part of this project. The ditches associated with Chandler Road support riparian grass habitats.

Riparian Forest

The riparian forest habitat on the Chehalis River valley floor is dominated by bigleaf maple (*Acer macrophyllum*), red alder (*Alnus rubra*), and Douglas-fir (*Pseudotsuga menziesii*) in the tree layer. Snowberry (*Symphoricarpos albus*), red elderberry (*Sambucus racemosa*), and Himalayan blackberry (*Rubus armeniacus*) are dominant shrub layer species. The dominant herb layer species include reed canarygrass, Sitka brome (*Bromus sitchensis*), perennial pea (*Lathyrus latifolius*), stinging nettle (*Urtica dioica*), and Oregon manroot (*Marah oreganus*).

Figure 3.4-1. Vegetation Cover Types
[8.5x11; color; GIS figure; see separate compiled figures]

The riparian forest north of the Chehalis River is located on an old lumber mill site that is now overgrown, but lumber mill remnants (such as large old timbers, braided steel cables, rusted metal fragments, and wood charcoal) are still visible in some locations. The forest canopy cover is patchy, providing openings where reed canarygrass dominates the understory.

South of the Chehalis River, the riparian forest has a denser, more contiguous tree canopy that shades out reed canarygrass in some areas, thereby allowing a higher proportion of native shrubs and forbs to persist in some locations, particularly along Stream 1. A former homestead east of Stream 2 supports non-native plum (*Prunus* sp.) and black locust (*Robinia pseudoacacia*) that are abundant components of the tree layer around the old residence. Streams 1 and 2 are relatively steep, incised transport reaches that provide minimal hydrology in support of riparian vegetation. Stream 2 directly supports red osier dogwood (*Cornus sericea*), giant horsetail (*Equisetum telmateia*), and Himalayan blackberry as dominant species in two very small, non-wetland floodplain portions of the riparian forest and one lower gradient stream section that supports palustrine wetland (see Wetland A description below).

Riparian forest on the upper banks of the Chehalis River provides a continuous if narrow band except along small stretches where the 2007 flooding eroded the high bank. Dense reed canarygrass dominates the understory. Native riparian shrub and forb species are present in some areas. The prevalence of residences and roads in the study area that intersect the riparian habitats substantially fragments the riparian forest in the Chehalis Valley.

Riparian Grassland

Reed canarygrass is ubiquitous in the study area and is the most abundant species in nearly all riparian grass stands. Himalayan blackberry, perennial pea, and Oregon manroot are codominant in some locations along with reed canarygrass. Riparian grass vegetation occurs on the old lumber mill site north of the river and south of the river, primarily in old fields used for agricultural purposes in the past. In roadside ditches along Chandler and Doty Dryad roads, the species composition includes creeping bentgrass (*Agrostis stolonifera*), perennial pea, and English plantain (*Plantago lanceolata*) as the dominant plant species. The lowest, wettest portion of the ditch along the west side of Chandler Road also supports hydrophytic species including soft rush (*Juncus effusus*) and Mexican muhly (*Muhlenbergia mexicana*) but not as dominant species. Riparian grass vegetation on the lower banks adjacent to Stream 2 generally also supports giant horsetail, a known hydrophyte, as a codominant species along with reed canarygrass and Himalayan blackberry. Residences and the ditch on the east side of Chandler Road support many of the same dominant riparian grass species, but they are regularly mowed and maintained as lawn or are grazed pasture.

3.4.1.2 Wetland and Riverine Habitat

The wet habitats within the study area are associated with the Chehalis River and Stream 1 and Stream 2 (see Figure 3.4-1, *Vegetation Cover Types*). Riverine habitat along the Chehalis River occupies approximately 1.59 acres along 403 feet of river flowing through the study area. Riverine habitat along Stream 1 occupies 0.07 acres (3,088 square feet) along approximately 386 linear feet. Stream 2 is a tributary to Stream 1 that supports 0.005 acres (204 square feet) of riverine habitat along approximately 136 linear feet within the study area. There is one palustrine emergent wetland that occupies 0.02 acres (885 square feet) abutting Stream 2.

Chehalis River

The Chehalis River originates in southwestern Lewis County west of Chehalis. From there, it flows east to Chehalis, then north by the city of Centralia, after which it flows west and eventually empties into Grays Harbor, an estuary of the Pacific Ocean. Within the study area (approximately RM 98), the river banks rise steeply 25 to 30 feet above the river. In some locations on the south bank, there is an approximately 25-foot-wide bench of floodplain elevated 10 to 15 feet above the river bed. However, most of the Chehalis River has riverine habitat that is steeply cut bare sedimentary bedrock or it supports dense colonies of reed canarygrass.

Various hydrophytic grass and forb species form a sparse vegetation cover (less than 2 percent cover) on the lowest in-channel alluvial surfaces. Narrow areas contain a dense cover of reed canarygrass and variously distributed patches of giant horsetail, red osier dogwood, Himalayan blackberry, snowberry, and red alder. Vegetation cover in the riverine habitat varies with the amount of disturbance. The Chehalis River is a Traditional Navigable Water (TNW) and is considered to be a jurisdictional non-wetland Water of the U.S. under Section 404 of the CWA.

Stream 1

As described in 3.3.1.2 (*Site Hydrology*), Stream 1 is an intermittent stream that flows directly into the south side of the Chehalis River via a concrete box culvert under Doty Dryad Road (see Figure 3.4-1, *Vegetation Cover Types*). There are no low-lying or floodplain surfaces along the channel, which has moderately incised cut banks approximately 1 to 3 feet tall. Red alder, hazelnut (*Corylus cornuta*), red osier dogwood, oso berry (*Oemlaria cerasiformis*), Himalayan blackberry, Oregon manroot, stinging nettle, lady fern (*Athyrium felix-femina*), maiden hair fern (*Adiantum aleuticum*), red elderberry, and a few Sitka willow (*Salix sitchensis*) line the banks and densely overhang the riverine habitat associated with Stream 1. The riverine habitat of Stream 1 meets the definition of a Relatively Permanent Water (RPW) and is considered to be a jurisdictional non-wetland Water of the U.S. under Section 404 of the CWA because it flows directly into the Chehalis River, a TNW.

Stream 2

As described in 3.3.1.2 (*Site Hydrology*), Stream 2 is a relatively linear intermittent stream that flows into the Chehalis River via Stream 1 (see Figure 3.4-1, *Vegetation Cover Types*). Two small floodplains, one on the left bank (250 square feet) and one on the right bank (750 square feet) support upland riparian grassland and riparian forest, respectively. The majority of Stream 2 in the project area is confined by abrupt tall banks. Reed canarygrass is the dominant species along the channel and extends up the banks onto the valley floor in the northern half of the drainage. The riverine habitat associated with Stream 2 is vegetated in where it overlaps Wetland A; panicled bulrush (*Scirpus microcarpus*) with some reed canarygrass grows in the streambed, although most of the bed is bare silt. (See the description below for the palustrine emergent wetland for more detail on streamside wetland habitat.) The southern portion of this riverine habitat is steeper, more incised, and has little if any vegetation cover except the overhanging riparian forest along the right bank. Stream 2 meets the definition of an RPW and is considered to be a jurisdictional non-wetland Water of the U.S. under Section 404 of the CWA because it flows indirectly into the Chehalis River (a TNW) via Stream 1.

Palustrine Emergent Wetland

An 885 square foot (0.02 acre) palustrine emergent wetland (Wetland A) was delineated along the upper portions of Stream 2 in the project study area during the wetland delineation conducted for this project. This small riparian wetland was rated as a Category III wetland under the Ecology wetland rating system (Hruby 2004). Wetland vegetation occupies a 2- to 5-foot wide streamside bench that is approximately 16 inches above the silt-bottom bed of Stream 2. The emergent vegetation is dominated by reed canarygrass and panicled bulrush with small amounts of giant horsetail. The hydrology of the narrow bench wetland is supported entirely by capillary action from intermittent flow in Stream 2. The palustrine emergent wetland meets all three wetland criteria required to qualify as a wetland and is proposed as a jurisdictional wetland under Section 404 of the CWA because it directly abuts an RPW (Stream 2) that flows indirectly (via Stream 1, also an RPW) into a TNW (the Chehalis River). A more detailed description of this wetland is presented in EDAW AECOM (2009a).

3.4.2 ENVIRONMENTAL CONSEQUENCES

This section describes the potential effects of the No Action Alternative and the Proposed Action on botanical resources in the project area.

3.4.2.1 Regulatory Considerations

The following narrative provides a summary of the applicable regulations regarding vegetation, wetlands, and streams in the project area.

Section 404 of the Clean Water Act

Actions affecting waters of the United States and the discharge of dredged or fill material into U.S. waters, including wetlands, are regulated by Section 404 of the CWA. The objective of the CWA is to restore and maintain the chemical, physical, and biological integrity of the waters of the United States. The USACE regulates Section 404 activities and provides approvals and permits as applicable.

Section 401 of the Clean Water Act

Section 401 of the Clean Water Act requires that activities permitted under Section 404 meet state water quality standards. Ecology is designated by statute as the state agency responsible for issuing this water quality certification in Washington, and the agency is required to review and certify that proposed projects meet state standards. The federal permit is not valid unless it has been certified by Ecology. This certification is required on all USACE General Permits as well as all Individual Permits.

Executive Order 11990 Protection of Wetlands

Executive Order (EO) 11990 (Protection of Wetlands) defines wetlands as "those areas that are inundated by surface or ground water with a frequency sufficient to support and under normal circumstances does or would support a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction." The EO direct federal agencies to avoid, to the extent possible, both short-term and long-term adverse effects associated with the

occupancy and modifications of wetlands. FEMA uses the Eight-Step Planning Process to meet the requirements for complying with EO 11990 as required by regulation 44 CFR Part 9. Step 1 of the planning process is to determine whether a proposed action is located in a wetland, as described above in Section 3.4.1.2 (*Wetland and Riverine Habitat*).

Washington State Growth Management Act

The Growth Management Act, or GMA (Chapter 36.70A RCW), requires state and local governments to manage Washington's growth by identifying and protecting critical areas and natural resource lands, designating urban growth areas, preparing comprehensive plans, and implementing them through capital investments and development regulations. Lewis County Code, Title 17, Land Use and Development Regulations (LCC 17.35A.720-.790) defines criteria for identification and protection of Fish and Wildlife Habitat Conservation areas, which largely adopts the WDFW Priority Habitats and Species (PHS) program recommendations for wildlife and habitats. Lewis County has developed a Critical Areas Ordinance that provides requirements for maintaining buffers for wetlands and streams based on their characteristics and compensatory mitigation requirements. These elements would be addressed by Lewis County during the permit process.

3.4.2.2 Methodology and Threshold of Significance

Methodology

Four EDAW AECOM biologists conducted a site visit on July 23 and 24, 2009, to collect information on general site conditions, special habitat features (including wetlands), and vegetation communities at the project site. Existing information was gathered from federal and state regulatory agencies regarding site conditions in the study area and from a literature review for applicable data pertaining to vegetation types in the project vicinity, particularly sensitive wetland habitats. NEPA does not provide significance thresholds for specific resource areas.

Threshold of Significance

The No Action Alternative and the Proposed Action were determined to result in a significant effect on vegetation or wetlands if they would:

- Permanently disturb or degrade a substantial amount of sensitive natural communities such as riparian and riverine habitats.
- Affect rare plants, including federally listed species.

3.4.2.3 Alternative A: No Action

Under the No Action alternative, the Chandler Road bridge would not be replaced. There would be no effects on vegetation or wetlands, and the site would remain in its general current condition.

3.4.2.4 Alternative B: Proposed Action

Under the Proposed Action, the project would have both temporary and permanent effects on vegetation. Vegetation effects on residential property and previously disturbed areas are anticipated to be insignificant with regard to botanical resources and are not described further.

Riparian Forest and Grassland

Use of heavy construction equipment is expected to temporarily affect upland vegetation in the areas immediately adjacent to the project features such as roads, embankments, and fill areas. Temporarily disturbed areas would be seeded as appropriate, and vegetation would naturally colonize these sites. This would result in a minor, temporary adverse effect on vegetation in between the time when construction occurs and vegetative cover returns to these sites.

Approximately 0.38 acres of riparian forest and 0.75 acres of riparian grassland would be removed from construction and replaced with permanent project features such as roads and fill. This is a relatively small amount of upland vegetation loss and is considered a minor, long-term adverse effect. Corresponding effects on wildlife are discussed in Section 3.5, *Fish and Wildlife*.

The existing approach road to be decommissioned would have its asphalt surface removed and would be hydroseeded. Eventually, this approximately 17,100 square foot area (0.39 acres) would revert to more naturalized upland vegetation that will provide some mitigation for the project effects.

Wetland and Riverine Habitats

There are no anticipated effects on Wetland A, the only wetland identified in the project area. Temporary adverse effects on vegetation along the two small streams in the project area may result from the use of heavy equipment, culvert installation, and other construction. Areas outside the footprint of permanent project features would be hydroseeded as appropriate and allowed to regenerate with natural recruitment. These are considered minor, temporary adverse effects.

Areas within the OHWM of the Chehalis River would be disturbed from constructing and installing the bridge abutments and installing riprap around the abutments to protect the integrity of the structure. This area of permanent disturbance is estimated to be 1,800 square feet. Most of the affected area is bare sand or rock, with some sparsely vegetated areas.

Stream 1 would be permanently altered by routing 140 linear feet of the stream (0.26 acres) into a culvert, under the constructed roadway. Stream 2 would be realigned 20 feet within an engineered channel to its new confluence with Stream 1 at a point downstream of the new Stream 1 culvert outlet. While not eliminated, the function the streamside vegetation associated with these streams would be altered. The effects on the vegetation along the Chehalis River and Streams 1 and 2 are considered minor, permanent adverse effects.

Mitigation Measures and Residual Effects

Mitigation measures to compensate for the effects on the Chehalis River OHWM and Streams 1 and 2 will be developed during the CWA Section 404, Section 401, and HPA processes with the USACE, Ecology, and WDFW. In addition, the project will be required to meet the compensatory mitigation requirements of the Lewis County Critical Areas Ordinance.

Significant and Unavoidable Adverse Effects

There would be no significant adverse effects from implementation of Alternative B.

3.5 FISH AND WILDLIFE

The following narrative documents the fish, wildlife, and habitat resources of the project study area, with a project analysis from a wildlife habitat perspective.

3.5.1 AFFECTED ENVIRONMENT

The affected environment for the purposes of this section is the project study area, although local habitat context is considered as well where appropriate.

3.5.1.1 General Wildlife and Habitat

Habitat within the project study area is dominated by riparian habitats in a rural agricultural setting, and supports wildlife tolerant of moderate but persistent human presence. The primary habitat feature is the Chehalis River, which divides the study area into northern and southern portions.

North of the Chehalis River, the study area consists mainly of Chandler Road and the associated ROW, providing little to no habitat value. Immediately east of the study area, vegetation is associated with residential properties, and includes lawns, landscape plants, and a mix of native and non-native shrubs and forbs, with few trees. Residences in the local area are sparsely distributed in small clusters, and set within a rural matrix of various agricultural land uses. Black-tailed deer (*Odocoileus hemionus columbianus*) and barn-swallows (*Hirundo rustica*) are two native species that benefit from rural residential habitats, although this land use pattern also attracts non-native species, such as European starlings (*Sturnus vulgaris*) (Theobald et al. 1997). Large trees are present within the study area west of Chandler Road, including several big-leaf maples, one tall Douglas-fir, and several multi-stemmed big-leaf maple snags showing signs of woodpecker activity. The snags are also likely to support perching raptors and have potential for cavity-nesting species. Dominant understory plants west of the study area include Himalayan blackberry and perennial pea, which provide dense cover and food for small wildlife, although these species stifle plant diversity and reduce habitat complexity (Halpern and Spies 1995), resulting in lower overall species richness and disfavoring those species that rely on native plant communities.

South of the Chehalis River, Doty Dryad Road separates the riparian corridor of the Chehalis River from the upper terraces of the historical floodplain, leaving a narrow ribbon of riparian forests interspersed with sand deposits sandwiched between the river and Doty Dryad Road. Agricultural fields dominate the western portion of the study area south of the river. On the south side of Doty Dryad Road, fields are mowed, mixed-grass-dominated agricultural pasture with compacted soils. These areas provide little cover, very little habitat structure or food source, and offer generally poor wildlife habitat. Cleared agricultural land on the southwest portion of the project site, between Stream 1 and SR 6, is essentially an abandoned reed-canarygrass pasture and provides better cover but no food and little habitat structure or complexity. Native and non-native trees and shrub habitat surrounding the abandoned residence, south-centrally located in the project study area, provides low to moderate structural complexity, cover, and a greater diversity of food sources due to the high number, species, and age diversity of trees and shrubs. Black cottonwood (*Populus balsamifera*), red alder, and a plum tree cultivar are the dominant canopy with an understory of reed canarygrass, Himalayan blackberry, manroot, elderberry, swordfern (*Polystichum munitum*), and a mix of native and non-native shade-tolerant herbaceous plants. This area is relatively densely vegetated and likely

supports a variety of songbirds, small mammals, and insects. Wildlife species heard and seen on site during the July 2009 field survey include the species listed in Table 3.5-1.

Table 3.5-1. Fish and Wildlife Detected on Project Site, July 23 and 24, 2009.

Common Name	Latin Name	Typical Habitat
Birds		
Yellow warbler	*Dendroica petechia*	Hardwood thickets, riparian areas
Black-capped chickadee	*Poecile atricapillus*	Mixed woodlands, widely present
Swainson's thrush	*Catharus ustulatus*	Dense forests
Song sparrow	*Melospiza melodia*	Dense brush and riparian areas
Belted kingfisher	*Megaceryle alcyon*	Fish-bearing waters, cliff banks
Vaux's swift	*Chaetura vauxi*	Old-growth forests, snags
American goldfinch	*Carduelis tristis*	Brushy thickets, widely present
American crow	*Corvus brachyrhynchos*	Widely present
Steller's jay	*Cyanocitta stelleri*	Conifer forests, mixed woodlands
Cedar waxwing	*Bombycilla cedrorum*	Forest edges and riparian areas
Barn swallow	*Hirundo rustica*	Open agricultural areas, near water
Spotted sandpiper	*Actitis macularia*	Sandy riparian shores
Turkey vulture	*Cathartes aura*	Dry forests, widely present
Red-breasted nuthatch	*Sitta canadensis*	Conifer forests
European starling	*Sturnus vulgaris*	Near human settlements
House sparrow	*Passer domesticus*	Near human settlements
Pacific slope flycatcher	*Empidonax difficilis*	Wet forests
American robin	*Turdus migratorius*	Woodland edges, widely present
Amphibians		
Red-legged frog	*Rana aurora*	Ponds and slow waters, mesic forests
Columbia torrent salamander	*Rhyacotriton kezeri*	Seeps, small fishless stream edges
Mammals		
Raccoon	*Procyon lotor*	Riparian corridors, mixed woodlands
Black-tailed deer	*Odocoileus hemionus columbianus*	Forest edges
Virginia opossum	*Didelphis virginiana*	Riparian areas, widely present locally

Source: Developed by EDAW AECOM.

3.5.1.2 Rivers, Streams, and Wetland Habitats

A variety of riparian habitats are within the study area, including the Chehalis River, Stream 1, and Stream 2 along with its adjacent wetland. Of these, only the Chehalis River contains year-round flow. Functionally, all non-road associated habitat within the proposed construction footprint is riparian.

The Chehalis River at the project site is a mix of silt and bedrock substrates with a high sediment load and relatively warm waters resulting from land use changes and riparian vegetation removal in the basin (Chehalis River Council 2007). Agriculture is concentrated within the Chehalis River floodplain, and the river has had ongoing issues with high water temperatures, low dissolved oxygen, and suspended solids that affect fish and aquatic macroinvertebrates. Recent flooding, which necessitated this project, removed many areas of overhanging vegetation and exposed more of the water surface to solar heating. Large deposits of silt and sand alluvium occur along the riverbanks, with a large sandy-silt terrace deposit approximately at the new bridge crossing on the

south bank. These "sandy beach" riverbank areas are used by raccoons (*Procyon lotor),* opossums (*Didelphis virginiana),* black-tailed deer, and spotted sandpiper (*Actitis macularia),* although people also frequent the area for fishing and swimming. Riparian banks on the north side of the river are steep and less accessible, while banks on the south side are more gently sloped, with some intact riparian forest patches among the sand terrace deposits. Documented fish presence is listed in Table 3.5-2, although sculpin (*Cottid* spp.) and three-spined stickleback (*Gasterosteus aculeatus)* are widely present along the Chehalis River, and may access Stream 1 during seasonally high flows. It is not likely that Stream 2 supports fish because of its steep confluence with Stream 1, its small size, and lack of habitat structure.

Figure 3.5-1. Stream 1 Box Culvert, Looking Upstream from the Chehalis River.

Stream 1 is a bedrock-bottomed tributary to the Chehalis River, with native overhanging vegetation. The basalt substrate of this stream is a unique habitat feature relative to the dominant sedimentary substrates of the Upper Chehalis basin; however, water quality in the stream is suffering from sedimentation and elevated water temperatures (Chehalis River Council 2007). Overhanging

vegetation, much of it native, provides substantial leaf litter inputs and shade to the stream. Stream 1 is likely providing a travel corridor and refuge for species avoiding the roadways to the north and south of the stream, and provides a direct connection to the Chehalis River via the box culvert under Doty Dryad Road, which is fish passable from fall through spring, but not at summer low flows. Fish data are not available for this creek (WDNR 2006); however, it is possible that young coho salmon (*O. kisutch*) could use Stream 1 as a refuge from high velocities in the Chehalis River at high flows, but the stream provides no spawning habitat. Reticulated sculpin (*Cottus perplexus*) were abundant in Stream 1 during the low-flow field visits. In addition to fish, amphibians are frequently found using perennial bedrock streams (Wilkins and Peterson 2000). Two adult red-legged frogs (*Rana aurora*) and two larval Columbia torrent salamanders (*Rhyacotriton kezeri*) were seen in Stream 1 during the July 2009 field surveys.

Figure 3.5-2 Stream 1, 20 feet Upstream of the Box Culvert.

Stream 2 is not passable to fish because of its small size and steep confluence with Stream 1. The Stream 2 riparian corridor may support macroinvertebrates, but it does not appear to support

vertebrates, outside of providing a water source for small mammals and birds. Vegetation at the confluence with Stream 1 is riparian, and at this point Stream 2 is dominated by the topography and vegetation of Stream 1. The habitat quality in Stream 2 and the associated wetland and riparian area, 50 feet upstream of the confluence, is limited by the lack of diverse vegetation and habitat structure.

A small wetland is associated with Stream 2, documented in detail in the wetland report for this project (EDAW AECOM 2009a). Functionally, from a habitat and wildlife perspective, the wetland is not distinguished from Stream 2 in a meaningful way for vertebrate wildlife species.

Table 3.5-2. Fish Species Documented in the Project Study Area.

Common Name	Latin Name	Waterbody	State/Federal Status
Fish Species			
Chinook salmon[1] (Washington Coast ESU)	*Oncorhynchus tshawytscha*	Chehalis River	None/ Not Warranted
Coho salmon[1] (SW Washington ESU)	*Oncorhynchus kisutch*	Chehalis River	None/Undetermined
Steelhead trout[1] (SW Washington ESU)	*Oncorhynchus mykiss*	Chehalis River	None/ Not Warranted
Coastal resident cutthroat trout[1]	*Oncorhynchus clarkii* ssp. *clarkii*	Chehalis River	Species of Concern/ None
Reticulated sculpin[2]	*Cottus perplexus*	Stream 1	None/ None

[1] Source: WDFW 2009b; NOAA Fisheries 2009.
[2] Documented by EDAW AECOM biologists.

3.5.1.3 Threatened and Endangered Fish and Wildlife Species

The federally protected species list for Lewis County is maintained by the Western Washington Fish and Wildlife Office of the U.S. Fish and Wildlife Service (USFWS), and includes six threatened and endangered species (USFWS 2007). Critical habitat was designated by USFWS for northern spotted owls (*Strix occidentalis caurina*) and marbled murrelets (*Brachyramphus marmoratus*) within Lewis County, but not within 1 mile of the project area. Bull trout (*Salvelinus confluentus*) critical habitat does not extend upriver of Oakville, Washington, in Grays Harbor County, more than 50 miles downstream of the proposed project (Fed Reg. Vol. 70 No. 185, p. 56304).

Federal and state-listed threatened and endangered fish and wildlife species have not been documented within more than a 1 mile radius of the project study area by the Washington Department of Fish and Wildlife (WDFW) (WDFW 2009a, WDFW2009b, NOAA Fisheries 2009). Habitat in the vicinity is generally unsuitable for most listed species, as these species often require large tracts of wilderness with specific habitat features not available near the project study area. Bull trout have not been documented in the Chehalis River above Oakville, Washington, more than 50 miles downstream of the proposed project site (pers. comm., Chan 2009), and habitat parameters are unsuitable for bull trout in the Upper Chehalis basin (Rieman and McIntyre 1993).

Essential Fish Habitat (EFH) encompasses, in effect, all aquatic habitats that support fish, as defined in the Magnuson Stevens Act (as described below in Section 3.5.2.1). In the project area, this includes accessible habitat for salmon and steelhead. In the project area, the Chehalis River is used as a migratory corridor for salmon and steelhead, although no spawning habitat is present. Stream 1 is not fish accessible from the Chehalis River, except when river flows are high enough to facilitate movement between the river and this stream. Thus, EFH habitat is present in the Chehalis River.

Stream 1 could possibly provide refuge for young salmon during high flow events, but for much of the year the stream is not fish accessible from the river.

3.5.2 ENVIRONMENTAL CONSEQUENCES

Potential effects of the No Action Alternative and the Proposed Action on fish and wildlife within the project area are described below. Mitigation measures to offset any identified effects are also described, as applicable.

3.5.2.1 Regulatory Considerations

Applicable federal and Washington state regulations regarding fish and wildlife and their habitat in the project area are described below.

Magnuson Stevens Act

The Magnuson Stevens Act, re-authorized in 2006, requires federal agencies to consult with the National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NMFS) about actions that could damage EFH, defined in 50 CFR 600 of the federal regulations as:

> *"Essential fish habitat (EFH)* means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. For the purpose of interpreting the definition of essential fish habitat: "Waters" include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; "substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities; "necessary" means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle."

The act directs the National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NOAA Fisheries) and regional fishery management councils to minimize, to the extent practicable, adverse effects on EFH. EFH includes habitat that is accessible to anadromous salmon and steelhead, which are under NOAA Fisheries' jurisdiction.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) prohibits persons, except as permitted by regulations, "to pursue, take, or kill…any migratory bird, or any part, nest or egg of any such bird, included in the terms of conventions" with certain other countries (16 U.S. Code 703). Direct and indirect acts are prohibited under this definition, although harassment and habitat modification are not included unless they result in the direct loss of birds, nests, or eggs. The current list of species protected by the MBTA includes several hundred species and essentially includes all native birds, including many commonly found in lowland riparian habitats of western Washington.

State Endangered, Threatened, and Sensitive Wildlife Classification

The Washington Endangered Species Act (WAC 232-12-297) allows for three levels of species designation: Endangered, Threatened, and Sensitive. In addition, WDFW maintains a list of Candidate species, currently containing 113 species. Species managed under the law as of August

2009 include 28 Endangered, 10 Threatened, and 8 Sensitive species, none of which are documented in the project study area.

Washington State Growth Management Act

The Growth Management Act, or GMA (Chapter 36.70A RCW), requires state and local governments to manage Washington's growth by identifying and protecting critical areas and natural resource lands, designating urban growth areas, preparing comprehensive plans and implementing them through capital investments and development regulations. Lewis County Code, Title 17, Land Use and Development Regulations, LCC 17.35A.720-.790 defines criteria for identification and protection of Fish and Wildlife Habitat Conservation areas, which largely adopts the WDFW PHS program recommendations for wildlife and habitats. Lewis County is subject to these regulations through the state and local permitting process.

3.5.2.2 Threshold of Significance

The No Action Alternative and the Proposed Action were determined to result in a significant effect on fish or wildlife if they would:

- Interfere substantially with the movement of any native resident or migratory fish, bird, amphibian, or mammal species.
- Significantly adversely effect federally listed species or their habitat
- Conflict with the provisions of an approved local, regional, or state habitat conservation plan.
- Result in the long-term degradation of streams in the vicinity of the project.

3.5.2.3 Alternative A: No Action

Under the No Action Alternative, no bridge construction or related activities would take place. Streams, vegetation, and habitat would remain unaltered from the current condition, resulting in no project-related effects on fish, wildlife, or habitat resources.

3.5.2.4 Alternative B: Proposed Action

Anticipated effects of the Proposed Action include both temporary (construction related) and permanent effects. Table 3.5-3 summarizes effects on fish, wildlife, and habitat.

Temporary Effects

Temporary piers to support the bridge and temporary work platform during construction would require pile driving in the Chehalis River. Lewis County has not determined the specific methods for pile driving or the number of piers required; however, effects of pile driving, regardless of method used, would disturb aquatic species due to the wave energy transfer of the pile driving and the loosening of substrate soils. Several methods are available for pile driving; however, impact pile driving creates sudden, higher energy shock waves of both sound and energy in the water column that could injure and prevent escape of fish in the area (Hastings and Popper 2005). Vibratory pile driving causes a less abrupt acoustic pulse, and less sudden pressure wave energy transfer (Hastings and Popper 2005), allowing fish and wildlife to leave the area. Structurally, the piles and structures they support would not impede fish passage, and local, state, and federal permitting requirements would be developed during the permitting process to ensure that construction is within or as near as

possible to the WDFW permitted in-water-work window, the intent of which is to protect fish passage.

If pile driving is necessary outside of the in-water work window, additional measures may be needed to avoid effects on migrating fish, such as fish exclusion measures and underwater bubble curtains. Additionally, pile driving would create sediment by displacing substrate and soils in the Chehalis River bottom; although the Chehalis is a naturally high-sediment system, pile driving activities would mobilize soils and sediments below the surface, potentially resulting in increased sedimentation during and after the proposed project. Sedimentation effects may increase briefly with removal of the piers. Movement patterns of fish and wildlife within the project study area may be temporarily affected due to avoidance of the project area and associated noise and activity; however, no population level or substantial effects are anticipated. Pier installation and pile driving details would be developed and completed under the terms of permits issued by the USACE, Ecology, WDFW, and the Lewis County permitting authority.

Heavy construction equipment used during construction, and materials used for temporary structures such as the temporary access road, may pose a pollution threat to the waterbodies via possible contributions of petroleum products, cement, asphalt, tar, paint, and other chemical substances that could reach the river and affect the health of resident fish and wildlife (Waldichuk 1993). These products are also easily mobilized in water and would contribute to overall habitat degradation, affecting fish and wildlife species if they were allowed to reach the Chehalis River, Stream 1, or Stream 2. Additionally, materials used to build the temporary work pier may contain creosote, paint, or other chemical substances used to prevent rust and rot, but that have harmful effects on fish and wildlife, and may build up and mobilize in the Chehalis River. Standard materials capture plans, included with the TESC and SPCC plans for the project, would prevent materials from reaching waterbodies through all phases of the project, resulting in no effects on fish and wildlife movement or habitat. These plans would comply with all applicable plans, permits, and policies relevant to the project, and would prevent the potential for long-term degradation of habitat associated with the proposed project.

The temporary access road leading to the temporary work platform would disrupt shoreline continuity during construction; however, the shoreline at this location is often resculpted by the natural dynamics of the river, and the total area of roadway to be installed would be less than 1/4 acre, removed at the time of bridge completion. In addition, the area adjacent to the work platform site already receives moderately high traffic and human presence because of its proximity to Doty Dryad Road. The temporary access road may result in a small, temporary impediment to wildlife movement along the shoreline; however, this effect is both temporary and minor.

Permanent Effects

The proposed project would require clearing of riparian vegetation within the project footprint, and the alteration of Streams 1 and 2 within the project study area; these are anticipated to be the primary permanent effects on habitat. Riparian habitat adjacent to the lower 20 linear feet of Stream 2 and the 140 linear feet of Stream 1 to be placed in a culvert results in the loss of approximately 28,000 square feet (0.66 acres) of riparian habitat and 1,150 square feet of stream corridor associated with Streams 1 and 2. The lower 20 feet of Stream 2 would be moved to the east, and realigned to flow east in a riprap-lined drainage to the confluence with Stream 1. Chehalis River habitat degradation

below the OHWM due to protective riprap placement is approximately 500 square feet. Abutments would be built within the 100-year floodplain but above the OHWM. Habitat structures lost would include three large trees, two big leaf maple snags, and an area of largely invasive vegetation on the north side of the Chehalis River. Riparian habitat and habitat structure loss due to the proposed project would result in a direct and corresponding impact on wildlife currently using the area (Schaefer and Brown 1992).

While the bridge would span the river and bridge abutments would be placed outside of the OHWM, approximately 250 cubic yards of heavy loose riprap would be placed within the OHWM to protect the abutment structure on the north side of the Chehalis River. Chehalis River shoreline habitat loss from the riprap placement would be approximately 500 square feet. Riprap along the shoreline simplifies riparian habitat, increases water velocity, and reduces habitat complexity for fish and other aquatic species. Chinook salmon (*Oncorhynchus tshawytscha*) habitat use is adversely affected by riprap, and predation of juvenile Chinook and other salmonids may be directly affected due to habitat alteration from riprap placement (Garland et al. 2001). But because of the limited amount of riprap that will be placed for the project, there would be less than 0.01 fps increase in velocity along the Chehalis River bank near the bridge. This would be a negligible adverse effect on fish.

Table 3.5-3. Summary of Proposed Project Effects on Fish, Wildlife, and Habitat.

Project Action	Affected Resource	Nature of Effect	Mitigating Measures?
Temporary Effects			
Pile Driving	Chehalis River, fish habitat, fish movement corridor	Potential bioacoustic impacts on fish, sedimentation	Yes-Permitting would require sediment containment and considerations for fish
Heavy Equipment Activity	Chehalis River, project area habitat	Discourage travel through project vicinity; potential for harmful materials in waterways	Yes-TESC and SPCC plans
Temporary Construction Access Road	South bank Chehalis River, Stream 1	Sedimentation; shoreline and riparian access	Yes-TESC plan and BMPs; access issues do not warrant mitigation
Permanent Effects			
Stream Corridor loss	Stream 1, Stream 2	140 ft x 8ft (1,120 ft^2) Stream 1 loss; 20 feet x 1.5 ft (30 ft^2) Stream 2 loss	Mitigation would be required through the permitting process. Opportunities exist for on-site in-kind mitigation
Riparian Habitat Loss	Stream 1 and Stream 2 vegetated banks and buffers	28,000 square feet converted from vegetated riparian area to road bed (Stream 2 buffer loss is contained within Stream 1 buffer)	Mitigation would be required through the permitting process. Opportunities exist for on-site in-kind mitigation
Riparian & River Corridor Degradation	Chehalis River shorelines	500 square feet of riprap hardened shoreline	Mitigation would be required through the permitting process. Opportunities exist for on-site in-kind mitigation

The proposed project would result in no significant effects (temporary or permanent) on any native fish or wildlife species, and would comply with all applicable policies and ordinances through the permitting process. Although some habitat degradation and loss are unavoidable due to the Proposed Action, effects on fish and wildlife populations and their habitat are minor given the surrounding land uses and human activity levels at the project study area.

No habitat conservation plans apply to this project, and although riparian habitat loss would occur, the amount of loss is less than 1 acre, and does not rise to the level of affecting overall long-term riparian habitat quality. Permitting requirements are anticipated to further reduce the effects of riparian habitat loss.

Essential Fish Habitat (EFH) Determination

The Chehalis River is accessible to anadromous fish year round, and Stream 1 is seasonally accessible to fish from fall through spring; therefore, these are considered EFH (67 Federal Register [FR] 2343). In the project area, the Chehalis River is used as a migratory corridor for salmon and steelhead, although no spawning habitat is present. The WDFW Salmonscape database shows no fish use and U.S. Geological Services topographical maps show no perennial or intermittent streams where the stormwater streams (Stream 1 and 2) are located.

The source of Stream 1 is roadside stormwater conveyance from SR 6 and some point wetland water. It is listed by the WDFW as a nonfish seasonal (intermittent) stream and does not meet WDFW's parameters for fish habitat characteristics. Stream 1 is not fish accessible from the Chehalis River except when river flows are high enough to facilitate movement between the river and this stream. During high flow events Stream 1 could possibly provide refuge for young salmon, but for much of the year the stream is not fish accessible. Scott Brummer, WDFW Area Habitat Biologist, has determined Stream 1 does not have the potential for migration utilization and would not be essential to fish survivability or production upstream of where it crosses the first county road.

For the project, the confluence of Stream 1 and Stream 2 will be moved approximately 20 feet down from its existing location and 140 linear feet, or approximately 1,120 square feet, of Stream 1 would be placed in a culvert. A work window of July 1 to September 30 will likely be required for the project by the WDFW through the HPA permitting process, and this would apply up to ¼ mile from where fish presence is detected. Stream 1 will be required to be in low flow condition for approval of its culvert installation by WDFW. Mr. Brummer has stated that although there is the potential fish utilization for the lower half of Stream 1, with the implementation of WDFW work windows there should not be any effect to EFH.

The site where the bridge is proposed is composed largely of bedrock, and the bridge activity itself is not likely to impact fish habitat (pers. comm., Brummer 2009). It is estimated approximately 250 cy of riprap will be used to harden the area around the bridge abutment foundations below the OHWM. The HPA permitting process will identify whether or not the incorporation of large wood or other mitigating measures will be required regarding this aspect of the project. Mr. Brummer does not consider the proposed riprap to be an adverse effect to EFH, as the amount below the OHWM is minimal for a bridge structure of this size and it is thought the riprap will be high and dry most of the time, except during high water.

The installation of a temporary work platform installation is the primary aspect of the project that is considered to have the potential to adversely effect EFH. Specific construction, installation and removal designs will be required to comply with all WDFW requirements in the HPA permit process. This will likely include work window restrictions, pile installation methodology requirements, and backfilling pier holes upon removal of the temporary structure to ensure that fish do not become trapped in the shallow edges. Additional EFH conservation measures may also be required by the National Marine Fisheries Service (NMFS).

Mitigation Measures and Residual Effects

The Proposed Action would require local, state, and federal permitting. Permitting conditions typically require mitigation measures for stream and buffer area loss and other potential impacts on fish, wildlife, and habitat. It is anticipated that local and state permitting would require the creation or enhancement of riparian habitat, in-kind, to mitigate any loss in function due to riparian habitat loss from the project. Additionally, the WDFW, as part of the HPA permitting process, will require adherence to WDFW in-water work window timing restrictions and may require additional project design and construction considerations for sedimentation effects on native fish.

In addition to permitting requirements, consultation with the NMFS for EFH is being conducted by FEMA concurrently with the public review and comment period for this Draft EA. This consultation may identify EFH conservation measures that would be required in addition to HPA permit conditions as a condition of FEMA funding to offset any adverse effects to EFH.

Significant and Unavoidable Adverse Effects

There are no significant and unavoidable effects on fish and wildlife resources from either the No Action Alternative or the Proposed Action.

3.6 TRANSPORTATION AND ACCESS

This section describes the transportation infrastructure and access potentially affected by the project alternatives, including the Proposed Action and the No Action Alternative.

3.6.1 AFFECTED ENVIRONMENT

Transportation infrastructure potentially affected by the project alternatives includes SR 6, public local access roads within the project study area, private driveways, and public local access roads comprising alternative access routes. These are described below and shown in Figure 3.6-1, *Transportation and Access*.

SR 6 is the primary east-west connection between Interstate 5 and the Pacific Coast, through western Lewis County to Pacific County. SR 6 serves Chehalis and Pe Ell and is the primary access route to intervening rural areas. For much of its length, SR 6 closely follows the Chehalis River. Chandler and Doty Dryad roads form a 3-way intersection with SR 6 at the southern limits of the project site, on the south side of the Chehalis River. Public transportation infrastructure within the project study area is limited to local access roads owned and maintained by Lewis County. These include Chandler Road and Doty Dryad Road. Chandler Road is a two-lane local access road off of SR 6 that runs north-south, and that, prior to the washout of the Chandler Road bridge, served remote rural

areas on the north side of the river. Areas accessed via Chandler Road include scattered rural residences along Chandler Road, Leudinghaus Road, Kobe Road East, and the Dryad crossroads area; Chandler Road is the primary access route (classified as a truck route between SR 6 and Kobe Road East) (Lewis County 1999, as amended) to state and privately owned forest resource lands north of Dryad. Additionally, the Willapa Hills Trail runs east-west just north of the project study area through Dryad, and could previously be accessed from SR 6 via Chandler Road. Access to these areas is currently disrupted because of the bridge washout on Chandler Road, and longer alternative routes (described below) must currently be used to access these areas. Doty Dryad Road is a two-lane local access road that veers off in a northwesterly direction from SR 6, following the Chehalis River for approximately 0.5 miles before turning due west and eventually intersecting with several other public local access roads at Doty. Between Doty and SR 6, Doty Dryad Road serves scattered rural residences on the south side of the Chehalis River.

One private driveway is located within the project footprint on the north side of the river along Chandler Road. A second private driveway is located just beyond the northern limit of the project area on Chandler Road; however, this property is currently undeveloped (has no built structures) and unoccupied. Additionally, there is a private driveway located approximately 580 feet to the west of this intersection on the north side of SR 6 that is included in the affected environment.

Figure 3.6-1. Transportation and Access
[11x17 GIS color figure; see separate compiled figures]

Four alternative access routes (i.e., detours) are available to areas on the north side of the Chehalis River previously accessed via the Chandler Road bridge. These include two routes from the east and two from the west. One alternative access from the west would be unavailable during construction of the Proposed Action. The four alternative access routes, illustrated in Figure 3.6-1, include the following:

- **SR 6/River Road/Leudinghaus Road.** From the east, Chandler Road on the north side of the river may be accessed from SR 6 via River Road and Leudinghaus Road. This alternative route is approximately 7 miles long from SR 6 to the intersection of Leudinghaus and Chandler roads. As described in Section 1.7, *Related Activities,* the Leudinghaus Road bridge, located approximately 4.5 miles downstream of the project location, was also washed out during the December 2007 flooding of the Chehalis River. However, a temporary Bailey bridge is currently in place at the former Leudinghaus Road bridge site. The SR 6/River Road/Leudinghaus Road alternative route is available while the temporary Bailey bridge is in place. The temporary Bailey bridge is on loan to the Lewis County Public Works Department from WSDOT until January 2011. However, in the event of a state emergency, WSDOT has the right to take the bridge out for use elsewhere if necessary. As described in Section 1.7, *Related Activities,* Lewis County is proposing to replace the former Leudinghaus Road bridge under a separate project. Precluding the need for WSDOT to take the bridge, it is anticipated that Lewis County would be able to retain the WSDOT Bailey bridge until such time as a new Leudinghaus Road bridge is constructed, meaning this alternative route would continue to be available The WSDOT Bailey bridge is legally rated as being able to accommodate logging trucks; however, the turn radius onto the bridge from River Road (from the south) and Leudinghaus Road (from the north) is considered to be rather severe, and logging operations are not thought to be using this alternative route to access state and private forest resource areas north of Dryad.

- **SR 6/Ceres Hill Road/Meskill Road/Leudinghaus Road.** Should the WSDOT Bailey bridge be removed, it would not be possible to access Chandler Road north of the Chehalis River via the SR 6/River Road/Leudinghaus Road alternative access route. If this were to occur, Chandler Road north of the river could still be accessed from the east from SR 6 via Ceres Hill Road, Meskill Road, and Leudinghaus Road. Meskill Road intersects with Leudinghaus Road on the north side of the Chehalis River, just north of the former Leudinghaus Road bridge site and current location of the WSDOT Bailey bridge. The SR 6/Ceres Hill/Meskill/Leudinghaus alternative access route is approximately 10 miles from SR 6 to the intersection of Leudinghaus and Chandler roads, 3 miles longer than the SR 6/River Road/Leudinghaus Road alternative access route.

- **SR 6/Doty Dryad Road/Elk Creek Road/Chandler Road.** From the west, Chandler Road north of the Chehalis River can be accessed from SR 6 by traveling Doty Dryad Road west to Doty, then taking Elk Creek Road west from Doty to the western terminus of Chandler Road. From this location, Chandler Road can be traveled eastward all the way back to the Chandler/Leudinghaus intersection. The SR 6/Doty-Dryad/Elk Creek/Chandler alternative access route is approximately 6.3 miles from SR 6 to the intersection of Leudinghaus and Chandler roads.

- **SR 6/Stevens Road/Elk Creek Road/Chandler Road.** Access to Doty Dryad Road from SR 6 would be temporarily closed during construction of the project, and a slightly longer alternative route would be necessary to access Chandler Road north of the river from the west during this timeframe. This involves taking Stevens Road from SR 6 to Doty, then following Elk Creek Road to Chandler Road and traveling east back to the Leudinghaus/Chandler intersection. The SR 6/Stevens/Elk Creek/Chandler route is similar in length to the SR 6/Doty-Dryad/Elk Creek/Chandler route, at approximately 6 miles.

3.6.2 ENVIRONMENTAL CONSEQUENCES

Potential temporary (construction-related) and long-term (operational) effects of the No Action Alternative and the Proposed Action on transportation and access within the project area are described below. Mitigation measures to offset any identified effects are also described, as applicable.

3.6.2.1 Regulatory Considerations

There are no regulatory considerations directly pertaining to transportation and access within the project area.

3.6.2.2 Threshold of Significance

Significance under NEPA is determined by assessing the effect of a proposed action in terms of its context and the intensity of its effects. The proposed project is in a remote, rural area of Lewis County, and project-related transportation infrastructure consists primarily of local access roads with low traffic volumes. The Chehalis River bisects the project area and limits access routes from SR 6 to areas north of the river. Within this context, the No Action Alternative and the Proposed Action were determined to result in a significant effect on transportation and access if they:

- Would result in physical constraints or congestion that would impede travel.
- Would cause an increase in traffic that is substantial in relation to the existing traffic load and capacity of the road system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion).
- Would exceed, either individually or cumulatively, a Level of Service standard established for designated roads.
- Would substantially increase hazards because of a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., recreation and forestry vehicles).

3.6.2.3 Alternative A: No Action

Under the No Action Alternative, FEMA would not provide any funding for repair of the Chandler Road bridge crossing across the Chehalis River. There would be no construction or related activities and, therefore, no construction-related impacts on transportation or access in the project area.

The No Action Alternative would have long-term adverse effects on transportation infrastructure and access in the project area. Without FEMA funding, the Chandler Road bridge crossing of the Chehalis River would continue to be displaced from the Lewis County transportation network for an indefinite length of time. Without a bridge crossing at this location, access from SR 6 to rural residences, state and private forest resources, and the Willapa Hills Trail access at Dryad on the north side of the river via Chandler Road would remain in their current disrupted state indefinitely, or until such time as Lewis County moves forward with restoring the Chandler Road bridge with other funding.

Access between the north and south sides of the river would continue to require the use of the longer alternative routes described above. These four alternative access routes are comprised entirely of public local access roads and primarily serve rural residences. It is anticipated that these alternative routes would continue to incur minor long-term increases in car and light truck traffic over the pre-disaster condition due to Dryad area residents traveling them to access their homes near Chandler Road on the north side of the river. Additionally, logging truck and other forestry-related traffic would continue to use routes alternative to the former Chandler Road bridge crossing to access forest resource lands north of Dryad.

According to Lewis County, emergency service providers have expressed concern with the reduced options for crossing the Chehalis River between SR 6 and the Dryad area since the washout of the Chandler Road bridge. Lewis County Fire District 16 serves the Doty/Dryad area and other communities along SR 6, and has three fire stations in the project vicinity: one in Doty, one in Dryad, and one at Meskill. Lacking the Chandler Road bridge crossing, emergency service providers must use the longer alternative routes to travel to and from the stations and to incidents needing their attention. This has increased their average response time to incidents in the area by approximately 15 minutes (pers. comm., Newell 2009).

3.6.2.4 Alternative B: Proposed Action

Under the Proposed Action, FEMA would provide funding for the project and the Preferred Engineering Alternative, as described in Section 2, *Alternatives, Including the Proposed Action*, would be implemented. Implementation of the Proposed Action would result in negligible to minor

temporary (construction-related) impacts on transportation and access, and minor long-term (operational) impacts on private driveway access, and would have significant long-term beneficial effects on transportation and access in the project and surrounding areas north of the Chehalis River.

Short-Term (Construction-Related) Impacts

Constructed-related activities that would temporarily impact transportation and access relative to current conditions include temporary road closures, traffic diversions, and driveway alternations (see Figure 3.6-2: *Construction Impacts on Transportation and Access*). On the south side of the Chehalis River, Doty Dryad Road would be closed to non-local traffic between SR 6 and its intersection with Stevens Road, Lusk Road, and Doty Street near Doty. Limited access to local residences along Doty Dryad Road would be maintained from the west, east to the last private driveway access point. However, Doty Dryad Road would be closed to all traffic from SR 6 to the western project terminus along this roadway. Traffic that might usually access Doty Dryad Road from the east from SR 6 would be required to divert to Stevens Road, a little more than 2 miles to the west. This would increase travel routes up to approximately 1.7 miles for residents living along Doty Dryad Road; however, travel routes for any through traffic would be essentially the same length. The area affected by this road closure and traffic diversion is not heavily populated, and there are no known destination spots. This road closure and traffic diversion is expected to have a negligible impact.

On the north side of the Chehalis River, Chandler Road would be closed to non-local traffic from its intersection with Leudinghaus Road south to its current terminus at the river. Since the Chandler Road bridge washout in December 2007, there has been no through access from SR 6 via Chandler Road to the Dryad area, and this segment of Chandler Road currently serves only a few local residents. This road closure is expected to have minor temporary impacts on the few residents living in this area during construction.

Figure 3.6-2. Construction Impacts on Transportation and Access.
[8.5x11 GIS figure; color; see separate compiled figures]

The Proposed Action would include the reconfiguring of one private driveway to the property closest to the river on the north side to match the driveway up with the slightly altered alignment and increased elevation of the Chandler Road bridge approach in this area. Access to this property would be partially disrupted while work takes place on the northern approach roadway and the driveway. However, the contractor would be required to maintain ingress and egress to all private driveways for the duration of the project, and would be required to coordinate construction of the driveway approach with the property owner to minimize disruption of their access.

In addition to the road closures and traffic diversions described above, there is some potential for temporary minor impacts on traffic flow along SR 6 and alternative access routes during various construction phases of the project. Construction of the project would require the transport of large construction equipment (e.g., excavators, dozers, backhoes, cranes) and large quantities of material to the project site on both sides of the river, increasing the volume of traffic along these roadways during construction. It is expected that effects would be concentrated toward the early stages of the project when the majority of construction materials and equipment are transported to the project site. During later stages, increases in construction-related traffic would predominantly be from construction workers traveling to and from the site each day.

All project-related temporary traffic control would be required to conform to WSDOT standard specifications and the manual of uniform traffic control devices. These measures would minimize effects on transportation and access to the extent practicable.

Long-Term (Operational) Impacts

Long-term adverse effects on transportation and access related to operation of the Proposed Action are minimal and related to the driveway alteration on the north side of the river described above, and access to the driveway to the west of the project study area along SR 6. The private driveway on the north side of the river would be permanently altered, with its length and grade increasing relative to the existing configuration. Construction of this driveway approach would be required to comply with Lewis County standards. This is considered to be a permanent but minor impact.

The existing 3-way Chandler Road/Doty Dryad Road intersection with SR 6 is approximately 580 feet east of the affected driveway along SR 6. This driveway is to the McCloud parcel described in Section 3.1, *Land Use*. The new Chandler Road/SR 6 intersection would be approximately 160 feet east of the McCloud driveway (from the centerline to centerline). The proposed project is required to comply with WSDOT and Lewis County standard specifications for road, bridge, and municipal construction. These include WSDOT geometric standards, including sight distance. SR 6 is a Class 3 highway with regards to road approaches, which requires spacing of 330 feet between approaches. For the proposed intersection to be only 160 feet from the McCloud driveway would require WSDOT granting a variance. Additionally, the sight distance would need to be enhanced by brushing WSDOT ROW along SR 6 west of the proposed intersection. The closer proximity of this intersection to the McCloud driveway would likely have some minor adverse effects on the private access due to slowing of traffic turning onto Chandler Road. Lewis County is in continuing discussions with WSDOT regarding this design issue, and would comply with any conditions associated with the anticipated variance for the proposed intersection.

The primary effects of the Proposed Action on transportation and access would be beneficial. Implementation of the Proposed Action would replace and improve Lewis County transportation infrastructure damaged during the December 2007 flooding of the Chehalis River and would restore access between SR 6 and the Dryad and surrounding areas to pre-disaster conditions. Access to these areas would no longer require use of the much longer alternative routes, which would have a significant beneficial effect on access to these areas, including for logging trucks and emergency service vehicles. Reconfiguration of the Chandler Road intersection with SR 6 and Doty Dryad Road, and the corresponding decommissioning of the Doty Dryad Road/SR intersection would have no significant effect on transportation or access in the project area.

Mitigation Measures and Residual Effects

All project-related effects on transportation and access that are adverse are expected to be temporary and/or minor. Project-related effects are primarily anticipated to be beneficial. No additional mitigation measures beyond those incorporated as part of the project and described above are proposed.

Significant and Unavoidable Adverse Effects

No significant and unavoidable adverse impacts on transportation and access are anticipated to occur due to implementation of the proposed project.

3.7 ENVIRONMENTAL JUSTICE

3.7.1 AFFECTED ENVIRONMENT

For the purpose of evaluating environmental justice effects of the Proposed Action, the affected environment is defined as the population of Lewis County, with statistics for the state of Washington provided for comparison. Table 3.7-1 presents the race and ethnicity of Lewis County and Washington state residents as reported by the 2000 U.S. Census of Population and Housing (U.S. Census Bureau 2004). The most prevalent race or ethnicity in the affected area is identified as White, with mixed race and American Indians and Alaskan Natives the most prevalent minority groups at 1.4 and 1.3 percent of the total population, respectively. Within the total population, 5.4 percent identify as ethnically Hispanic or Latino.

Table 3.7-1. Race/Ethnicity in Lewis County and Washington State 2000.

Race/Ethnicity	Lewis County (Percent)	Washington State (Percent)
White	96.0%	86.2%
Black	0.4%	3.4%
American Indian and Alaska Native	1.3%	1.6%
Asian	0.7%	5.6%
Pacific Islander and Native Hawaiian	0.2%	0.4%
Two or more races	1.4%	2.7%
Hispanic or Latino (of any race)	5.4%	7.5%

Source: U.S. Census Bureau 2004.

The U.S. Census Bureau's 2007 poverty estimates were used to determine low-income populations, defined by the Census Bureau as those households with income at or below 80 percent of area median household income. Estimated median household income in Lewis County in 2007 was $43,223; for Washington state as a whole, it was $55,628 (U.S. Census Bureau 2008). Approximately 14.2 percent of the Lewis County population lived below the poverty threshold, compared to 11.4 percent of the population of Washington state as a whole.

3.7.2 ENVIRONMENTAL CONSEQUENCES

3.7.2.1 Regulatory Considerations

Federal agencies are required, by Executive Order 12898 (Environmental Justice, 59 FR 7629 [1994]), to achieve environmental justice by addressing "disproportionately high and adverse human health and environmental effects on minority and low-income populations." Demographic information of a project area is examined to determine whether significant minority, low income, or native populations are present in the area affected by a proposed action. If so, a determination must be made as to whether the implementation or development of the proposed project may cause disproportionately high and adverse human health or environmental effects on these populations.

The Council on Environmental Quality (CEQ) defines "minority" to consist of the following groups: Black/African American, Asian, Native Hawaiian or Other Pacific Islander, American Indian or Alaskan Native, and Hispanic populations (CEQ 1997). Additionally, for the purposes of this analysis, "minority" also includes all other non-white racial categories within the U.S. Census Bureau's 2000 Census of Population and Housing such as "two or more races" (U.S. Census Bureau 2004). Guidance for determining thresholds of significance is available in *Final Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analysis* (EPA 1998). According to these guidelines, a minority population refers to a minority group that has a population of greater than 50 percent of the affected area's general population. No guidelines are published for determination of a significant low-income population; therefore, for purposes of this EA, a low-income population is considered to exist if there is a community whose general population is comprised of 25 percent or more of households living under the poverty threshold.

3.7.2.2 Threshold of Significance

Given the above guidelines, either alternative would result in a potential determination of significant effect on environmental justice if the affected environment:

- Would include one or many minority groups that comprise greater than 50 percent of the affected area's general population; or
- Would include a population with 25 percent or more of its residents living under the poverty threshold; ***and***
- An alternative would result in a disproportionately high and adverse effect on either or both of these populations.

3.7.2.3 Alternative A: No Action

Under the No Action Alternative, no construction activities would take place, resulting in no change to economic or other opportunities in the project area. No disproportionate effects on either minority populations or the general population would result from the alternative.

3.7.2.4 Alternative B: Proposed Action

Data provided in Section 3.7.1 (*Affected Environment*) indicate that neither minority populations nor low-income populations constitute a significant proportion of the population within the affected environment. Therefore, disproportionate effects on minority or low-income populations, which would constitute environmental justice effects, would not be created, and thresholds of significance would not be exceeded.

Proposed Mitigation Measures

No mitigation measures associated with environmental justice are proposed under either alternative.

Significant and Unavoidable Adverse Effects

The proposed project would contribute no significant or unavoidable adverse effects associated with environmental justice.

3.8 CULTURAL RESOURCES

This section describes cultural and historical resources present in the project Area of Potential Effects (APE), applicable federal and state regulations pertaining to the preservation of cultural and historical resources, and the potential effects of the project alternatives on cultural and historical resources in and around the project site. Information presented in this analysis is summarized from the *Cultural Resources Inventory and Evaluation Report* prepared for the project (EDAW AECOM 2009b).

Cultural resources, also referred to as historic properties, include resources of historical and/or archaeological significance. For purposes of this analysis, the term "archaeological resources" is used to refer to prehistoric or historical subsurface sites or objects, and the term "historic resources" is used to refer to above-ground historic buildings, sites, objects, structures, or districts.

Area of Potential Effects

Federal regulations define the APE as "the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if any such properties exist" (36 CFR 800.16[d]). The Chandler Road bridge APE consists of approximately 10 acres of existing roadway, pastures, meadows, and riparian corridor as shown on Figure 3.8-1, *Cultural Resources.*

3.8.1 AFFECTED ENVIRONMENT

The cultural setting, including a description of prehistory, ethnographic context, and historical patterns, is presented in detail in the *Cultural Resources Inventory and Evaluation Report: Leudinghaus and Chandler Road Bridge Replacement Projects* (EDAW AECOM 2009b), prepared specifically for this project to document cultural resources within and in the immediate vicinity of the project site. Key elements that influence potential effects associated with the proposed project are summarized below.

The project is situated within a region traditionally occupied by probably three Southwestern Coast Salish groups based largely on three related Salishan languages: the Upper Chehalis, Lower Chehalis, and Cowlitz groups (Hajda 1990). At the time of Euro-American contact, the Upper Chehalis and Cowlitz most likely occupied the project region and to a certain extent shared their territories in this area. The Chehalis and Skookumchuck rivers, closest to the project, would have been especially important to the people living in and near the project. Seasonal salmon runs were especially critical to their subsistence patterns, and to some degree tribal territories were centered on these major waterways (Hajda 1990).

The earliest documented Euro-American contact with native peoples in the Lewis County region occurred when Lewis and Clark led their famous expedition into the Northwest and camped along the Cowlitz River in March of 1806. Although they never entered what would become Lewis County proper, their entry into the region paved the way for future incursions and settlement in the general area. The establishment of Fort Vancouver in 1825 and Fort Nisqually on Puget Sound in 1833 by the Hudson's Bay Company provided increased trading opportunities, not only with distant tribal groups but with Euro-American traders and trappers as well (Hajda 1990).

With the Treaty of Washington in 1846 and the Oregon Donation Act of 1850, the Upper Chehalis and Cowlitz were forced from their traditional home territories and onto an unofficial "reservation" along the Chehalis River, which was only officially designated by the U.S. Government in 1864 (Hajda 1990). Throughout the 19th and well into the 20th centuries, tribal populations decreased dramatically and their traditional cultural patterns and practices were disrupted. They suffered through some additional difficulties by never accepting the oppressive treaty terms presented by the U.S. Government in the 19th century, resulting in their designation as a "non-treaty" tribe. Today, however, the Chehalis people are reinvesting in their community and culture through newfound economic and political influence.

Lewis County was established in 1845 as the first county in the Oregon Territory (including present-day Washington State). Lewis County became part of the Washington Territory in March 1853, which at the time included portions of present-day Washington, Idaho, and the western portions of Montana and Wyoming.

With its rich farmlands, numerous rivers, timber stands, and transportation routes, Lewis County and the project vicinity became important economic drivers of the region. Although agricultural pursuits were key elements in the local economy, nothing had as great an impact on the social, economic, and cultural foundations of the region as did logging. Improved logging and milling technology and the arrival of the railroad spurred the development of major lumber mills and entire towns in Lewis County (see Figure 3.8-2). Although now almost entirely gone, the town of Dryad and its supporting lumber mill (see Figure 3.8-3) were once located around and directly within the Chandler Road APE. Numerous such towns and mills once existed in the region and in Lewis County, but to a great extent, Dryad was typical and can be viewed as a representative example of the type of historical developments that once characterized a much broader geographic area.

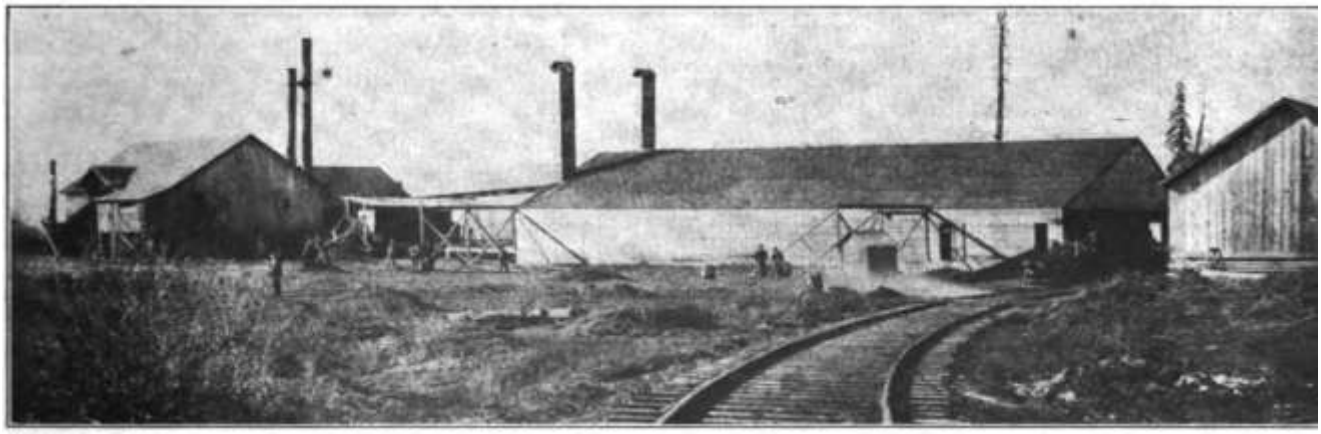

Figure 3.8-1. Shingle Mill, Dryad Washington 1900s (unknown company). Photo Courtesy of the Lewis County Historical Museum.

Figure 3.8-2. View of Dryad Washington – 1906. Photo Courtesy of the Lewis County Historical Museum.

The new town of Dryad boasted three hotels, a restaurant, post office, millinery, two general mercantile stores, three saloons, a church, a Good Templar lodge, a large number of residences, and even an opera house (Chehalis Bee 1898; Costello n.d.; 1907 Lewis County City Directory). Some of the homes were built by the Leudinghaus Brothers as worker housing (Chehalis Bee 1899). The 1907 Lewis County City Directory listed Dryad's population at 500, and one former resident estimated that the population reached 700 at one time (Onn 1985).

During the early to mid 1920s, the mills of Dryad were still operating and business was thriving. By the late 1920s/early 1930s, however, a decline began from which the town never fully recovered. The last mill in town, the Wasser-Hubbard Mill, burned down in May 1957 (Daily Chronicle 1957). Today, Dryad remains a small, unincorporated town with very few standing remnants of its heyday, with the exception of a few frame houses, the Dryad Baptist Church (still active), and the circa 1911 Dryad School, now converted into an apartment house (Graves 2008).

3.8.1.2 Cultural Resources Documented within the Project APE

No prehistoric or historic-era archaeological sites have been documented within or in the immediate vicinity of the Chandler Road bridge APE. However, several prehistoric sites were recorded in the general area by the University of Washington in 1969 (for additional information, see Appendix A of EDAW AECOM 2009b). Those closest to the APE consist of sites 45-LE-85, 45-LE-88, 45-LE-89, and 45-LE-90. Sites 45-LE-85 and 45-LE-90 were documented as sparse lithic scatters disturbed by agricultural activities (site -85) and bridge construction within Rainbow Falls State Park (site -90). Little information on exact site locations, aerial extent, potential depths, site integrity, temporal/cultural associations, or data potential was recorded at the time. Site -85 was recorded approximately 1 mile west of the APE, and site -90 is situated approximately 1.3 miles to the east on the south bank of the Chehalis River. Site -90 was recorded as having been disturbed by the construction of a bridge across the river, although no further details were provided in the site survey form. Based on existing data, it is not possible to determine whether either site could be eligible for listing on the National Register of Historic Places (NRHP).

Two additional prehistoric sites (45-LE-88 and 45-LE-89) were also recorded on the south bank of the Chehalis River but to the northwest and just outside the town of Doty. These sites appear to have been considerably larger and more complex than sites -85 and -90 and were recorded as having exhibited a range of artifacts including projectile points, drills, choppers, hammerstones, abraders, pestles, cooking stones, shell, charcoal, and bone fragments. The site survey form for site -88 also notes that Mrs. Charles Mauermann (presumably a descendent of Joseph and Karolina Mauermann who settle in the Doty-Dryad area in 1856) possessed a collection of mortars and adzes from the site. Another local individual, Mr. Victor (last name unknown), is also noted as having in his possession a large collection of artifacts from site -89. Artifacts documented by the University of Washington consisted of projectile points, mortars, pestles, and items described as blades and scrapers. Although no additional studies appear to have been conducted at either of these sites since their initial recording in 1969, based on the general accounts of artifacts found at these locations, both appear to have been much more substantial settlement and activity areas than sites -85 and -90 located in the general vicinity. Although existing information on sites -88 and -89 is also sparse, it does suggest that both sites may have been relatively large and complex and possibly capable of retaining important data, thereby possibly qualifying them for NRHP listing.

One historic-era resource has also been documented within and immediately adjacent to the Chandler Road bridge APE. This consists of a residential complex located at 127 Doty Dryad Road and is currently owned by Robert and Elizabeth Osborn. According to the Historic Property Inventory Report for this location (HRA 2008), the property includes a single-story house with a front-gabled, asphalt-shingled roof. The main entry door is centrally located in the north elevation, in a front-gabled projection that appears to have begun as an open porch. The house was built in 1925, the cladding consists of drop siding, and the windows appear to be replacements. A later gable-roofed garage is located adjacent and to the west of the house. Other vernacular sheds and outbuildings are situated on the property as well. Although the house is in good condition and retains the general feel and setting of its period of construction, the property does not retain any historically significant associations. Consequently, it was recommended not eligible to the NRHP (HRA 2008).

3.8.2 ENVIRONMENTAL CONSEQUENCES

3.8.2.1 Regulatory Considerations

Since funding for the project would be provided by a federal agency (FEMA), Section 106 of the National Historic Preservation Act (Section 106) constitutes the applicable regulatory framework. Section 106 requires that federal agencies take into account the effects of their undertakings (and those they fund or permit) on cultural resources that are listed or eligible for listing on the NRHP. To determine whether an undertaking could affect historic properties (those cultural resources listed or eligible for listing on the NRHP), cultural resources (including archaeological, historical, and architectural properties) must be identified, inventoried, and evaluated for listing in the NRHP. Listing or eligibility for listing on the NRHP is the primary consideration in determining whether a cultural resource that may be affected by a federal undertaking should be subjected to further research and documentation.

3.8.2.2 Methodology and Threshold of Significance

Methodology

The cultural resources investigation included archival research to determine if any previously documented prehistoric or historic-era cultural resources had been documented within or in the immediate vicinity of the project APE; an intensive archaeological field investigation; and native American consultation.

All aspects of the cultural resource investigation were conducted in accordance with the *Secretary of the Interior's Standards and Guidelines for Identification of Cultural Resources* (48CFR 44720-23). The study team consisted of professionally trained archaeologists meeting the federal *Secretary of the Interior's Professional Qualification Standards* (36 CFR Part 61; 48 FR 44716) and technical support personnel.

Archival Research

The archival research included an examination of historic maps, survey and cultural resources location maps, site survey forms, and historic property inventory reports archived at the Department of Archaeology and Historic Preservation office in Olympia; and of other documents, maps, and photographs on file at the Lewis County Historical Museum in Chehalis. This research indicated that while prehistoric and historic-era sites, features, and artifacts had been identified in the vicinity of the project APE, none had been recorded in or adjacent to the Chandler Road bridge.

Field Work

EDAW AECOM archaeologists conducted an intensive survey of the Chandler Road bridges APE from August 25 through August 30, 2009.

A total of 37 shovel test pits (STPs) were mapped and/or excavated within the Chandler Road bridge APE (with locations shown on Exhibit 14 of AECOM [2009b]). STPs 22-32 were placed in the eastern-most portion of the APE, north of the Chehalis River, adjacent to Chandler Road. STPs 22 and 23 extended through approximately 60 cm of recent flood deposits prior to encountering an older surface. In STP 22, a number of historic-era materials were found including wire nails, unidentified ferrous metal fragments, and brick and concrete fragments. Additional STPs along this transect (24-27, 28, 30) all contained dense concentrations of materials including brick, asphalt, and concrete fragments, coal, coal ash, wire nails, unidentified metal fragments, bottle and window glass, and burned wood. Within most of these STPs, fire-reddened earth was also present.

STPs 1 – 11 were placed in a heavily vegetated and highly disturbed area adjacent and to the west of the intersection of SR 6 and Doty Dryad Road. Much of this area consisted of steep slopes extending into a ravine or was heavily disturbed by mechanical earth-moving equipment in recent years. None of the STPs excavated in this area extended below the disturbances and two (1, 11) contained recent (1970s+) trash. STPs 12-21 were placed in an open field adjacent to the Osborn property in an area that exhibited some degree of flood deposition but also clear historic disturbances. STPs 13, 14, 19, and 20, however, contained historic-era artifacts such as white-glazed earthenware, bottle glass, and wire nails that appear to be consistent with the early 20th century construction date of the Osborn house. An additional six STPs (33–38) were excavated on the south side of Doty Dryad Road, also

on the Osborn property. Several of these tests (33, 35, 36) contained historic-era materials including wire nails, coal ash, and bottle glass, all of which appear to date consistently with the 1925 construction date of the Osborn's house and subsequent occupation throughout the 20th century.

No STPs were mapped or excavated along the south bank of the Chehalis River since this area consisted of an extremely steep bank extending down to the river's edge. Another portion of the APE adjacent to and to the west of Chandler Road was also not tested because of the heavily modified and disturbed character of the landscape. Large bulldozer push-piles, mounds of concrete fragments, trenches, and berms cover much of this area. This is related to the Simpson sawmill that was present at this location and, according to Mr. Forberg, burned circa 1930. The remains of the mill appear to have been further destroyed and leveled after the fire, with no further clean-up or construction having occurred on this property since. A pedestrian examination of this portion of the APE determined that any effective shovel-testing effort would have been impossible because of the disturbances and extensive refuse deposits. In addition, this entire area was heavily overgrown with dense vegetation; considering the highly irregular nature of the terrain, footing was exceedingly insecure, and due to safety concerns (and disturbances) the area was not subjected to testing.

Although historic-era artifacts were found within the project APE, none were temporally or functionally diagnostic (e.g., various metal fragments, non-diagnostic ceramic or glass fragments, coal ash, etc.), or were of such recent origin (e.g., a 1966-dated U.S. dime) that they were simply recorded and not recovered from the field.

Threshold of Significance

- As described in Section 3.8.2.1 above, the guiding elements for addressing potential effects on cultural resources are found in the National Historic Preservation Act (especially in Section 106), as well as the Archaeological Resources Protection Act, and the Native American Graves Protection and Repatriation Act.

3.8.2.3 Alternative A: No Action

Under the No Action Alternative, FEMA would not fund the project, and there would be no construction or related activities. No ground disturbance or clearing would occur. Therefore, the No Action Alternative would have no effect on cultural resources.

3.8.2.4 Alternative B: Proposed Action

Although several drainages intersect with the Chehalis River within and near this APE making it a desirable location of early Native American habitation due in part to historic-era disturbances, no evidence for prehistoric occupation was found at this location. However, extensive remains of the Simpson's sawmill (ca. 1911–1930) including landscape features, artifacts, and structure remains, have been noted within portions of the APE. Oral interviews, historic accounts, and archaeological evidence clearly indicate that when the mill burned ca. 1930, no further construction or manufacturing activities occurred on this site. Rubble piles, landscape features, numerous artifacts (such as machinery fragments, timbers, and masonry) scattered within and along the Chehalis River banks, and clear evidence of burning noted in the STPs (burned wood, charcoal, ash, heat-reddened earth) appear related to the construction, operation, and ultimate destruction of the Simpson Mill.

However, little of historic or archaeological importance remains within the APE. Although the mill may have been an important local business, it was only one of many lumber and shingle mills that existed in the Doty-Dryad community and the surrounding region. In addition, while the Simpsons may have been, to a certain extent, technological "innovators" in the regional logging industry, research has not suggested that their operations in general or this mill site in particular were especially significant in a historical sense. As a result, this site does not appear eligible for listing on the NRHP, and no further work is recommended at this location.

Other historic-era cultural material noted within the APE appears to be domestic in nature and solely related to the 20th century occupation of the Osborn property located on the south side of the Chehalis River opposite the Simpson Mill site. Earthenware and glass bottle fragments, wire nails, window glass, etc. found on and near the Osborn house (constructed 1925) do not suggest that any activities took place here beyond simple residential occupation and perhaps associated small-scale agricultural/grazing activities.

In summary, although numerous artifacts were found within the Chandler Road bridge APE, the history of the former mill site at this location has been well documented, and its lack of integrity and significant historical associations suggests that the site is not eligible for NRHP listing. Consequently, there would be no effect on historic properties at the Chandler Road bridge APE associated with the Proposed Action.

3.8.2.5 Mitigation Measures and Residual Effects

Due to the geophysical characteristics of the Chandler Road Bridge APE, and the presence of prehistoric sites in the vicinity of the APEs, it is always possible that undocumented archaeological deposits are present in areas that could be disturbed by the proposed project. In the event that unrecorded cultural resources are identified during project implementation, all potentially destructive work in the immediate vicinity of a find must cease until a qualified archaeologist can assess the significance of the find and if appropriate, provide recommendations for treatment. Subsurface prehistoric resources may take the form of stone tool and tool fragments, rock concentrations, burned and/or unburned shell or bone, and/or darkened sediments containing some of the above-mentioned constituents. Historic-era deposits can include fragments of glass, ceramic and metal objects, milled and split lumber, and structure and feature remains such as building foundations and refuse dumps.

3.9 CUMULATIVE EFFECTS

This section described the potential cumulative effects of the Proposed Action on natural and human resources in the project vicinity. The Propose Action is for FEMA to provide partial funding to Lewis County to restore access between SR 6 and the north side of the Chehalis River to its pre-disaster condition.

Cumulative effects are those that result from the incremental effect of a proposed action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other action (40 CFR 1508.7).

3.9.1 METHODOLOGY

The cumulative effects analysis presented here was conducted based on guidance issued by the CEQ in 1997 in their handbook *Considering Cumulative Impacts under the National Environmental Policy Act* (CEQ 1997) and advisory memoranda issued by the EPA in 1999 entitled *Consideration*

of Cumulative Impacts in EPA Review of NEPA Documents (EPA 1999) and 2005 entitled *Guidance on the Consideration of Past Actions in Cumulative Effects Analysis* (CEQ 2005).

3.9.2 ASSESSMENT OF CUMULATIVE EFFECTS

The effects of the Proposed Action are summarized in Section 2.6, *Summary of Effects.* Table 3.9-1 identifies the incremental effects of the Proposed Action; the aggregate effects of other past, present, and reasonably foreseeable future actions on the specific environmental and built resources evaluated in this EA, the Chehalis River valley ecosystem, and human communities inhabiting affected areas; and the significance of the effects of the Proposed Action when added to the aggregate effects of other actions.

3.9.3 CONSEQUENCES OF CUMULATIVE EFFECTS

The overall consequences of the cumulative effects of the Proposed Action, when added to the effects of other actions in the area, include four categories of effects. Negligible effects are connected to the capacity of the transportation infrastructure (other than private driveway access), agricultural and forestry practices, water quality, vegetation, flood stage elevation, environmental justice, or on cultural resources. Minor effects are associated with shoreline stability from the conversion of private property to public ROW along the Chehalis River, vegetation adjacent to wetlands, near-bank velocities, the Chehalis River floodplain, and access to private driveways along SR 6 and Doty Dryad Road. Potential incremental adverse effects are linked to the hydrology of the Chehalis River due to excavation and fill required by the project, and removal of riparian vegetation along the Chehalis River and its tributaries. Beneficial effects are expected to the transportation infrastructure in Western Lewis County that provides important access between the north and south sides of the Chehalis River for residents, businesses, forest resource activities, and emergency services.

Mitigation that would address the minor and incremental consequences to resources is addressed in the project permit and authorization process required, which includes but is not limited to approved project design criteria, the installation of both temporary and permanent BMPs, and the replanting of disturbed areas with native species to minimize the effects to shoreline stability.

Table 3.9-1. Cumulative Effects of the Proposed Action.

Resource Area	Effects of the Proposed Action	Effects of other past, present, or future actions	Do Effects of the Proposed Action Have an Incremental Effect When Added to the Effects of Other Actions? If so, what is the level of significance of the Proposed Action's effects?
Land Use	Conversion of 3.21 acres of private property to public roads and ROW.	The Leudinghaus Bridge Replacement project planned for 2011 would require similar types and levels of ROW acquisition of private property.	There are no known cumulative effects on specific private property parcels or land use in the project area for the Proposed Action. There is a minor cumulative effect on land use along the Chehalis River shoreline through the conversion of private property to public ROW. The incremental conversion of private property parcels to public roads and ROW along the Chehalis River shoreline in this general area would have no effect on land uses at a community or landscape scale. Further, the new transportation infrastructure (bridges and approach roads) would have the same capacity as pre-disaster conditions, and thus would not support additional development beyond the pre-disaster condition.
Geology, Soils and Shoreline Stability	No effects on geology. *Soils:* Construction activities (clearing, grubbing, grading) would result in negligible soil erosion. *Shoreline Stability*: The removal of shoreline vegetation within the construction footprint of the project would reduce shoreline stability. Permanent BMPs (geotextile retaining walls) incorporated into the project design would minimize this effect to a negligible level. If temporary work areas or access roads require the temporary removal of vegetation on the	No known effects on geology. *Soils*: the planned Leudinghaus bridge replacement project would have similar effects on soils. Agricultural and forestry practices in the Chehalis River valley and adjacent hillsides involve land clearing and soil-disturbing activities that can cause substantial erosion of soils. *Shoreline Stability*: The planned Leudinghaus bridge replacement project would have similar effects on shoreline stability.	No known cumulative effects on geology. *Soils*: The Proposed Action (and the planned Leudinghaus bridge replacement) would have a negligible incremental effect on soils when added to the effects of agricultural and forestry practices in the Chehalis River valley and on adjacent hillsides. *Shoreline Stability:* The Proposed Action would have an incremental adverse effect on shoreline stability. This incremental adverse effect is considered to be a minor when added to the effects of other actions that have reduced shoreline stability along the

Resource Area	Effects of the Proposed Action	Effects of other past, present, or future actions	Do Effects of the Proposed Action Have an Incremental Effect When Added to the Effects of Other Actions? If so, what is the level of significance of the Proposed Action's effects?
	river banks, Lewis County would require that these areas be replanted with appropriate native species to mitigate for effects on shoreline stability.	Some activities are likely to occur on private shoreline properties that could reduce shoreline stability	Chehalis River.
Hydrology, Water Quality, and Floodplains	*Hydrology*: The Proposed Action would increase the amount of impervious surface over existing conditions, would alter stream hydrology on two tributaries, and would affect the hydrology of the Chehalis River due to excavation and fill required by the project. *Water Quality*: Negligible effects from stormwater. *Floodplains*: Negligible effects on flood stage elevation and minor effects on near-bank velocities.	*Hydrology*: Past land use practices, including roads and bridges, have substantially altered the hydrology of the Chehalis River and tributary streams. The planned Leudinghaus bridge replacement project would have effects similar to the Proposed Action on the Chehalis River and one tributary stream. *Water Quality:* Past land use practices that involve land clearing and/or the addition of impervious surfaces, including agriculture, forestry, and roads and bridges, have similar and continuing adverse effects on water quality in the Chehalis River. The planned Leudinghaus bridge replacement project would have effects similar to the Proposed Action. *Floodplains*: Past and ongoing land use practices that involve land clearing, the addition of impervious surfaces, stream alteration, and fill within the floodplain have contributed to the severity of flooding in the Chehalis River valley. The planned Leudinghaus bridge replacement project would have effects similar to the Proposed Action.	*Hydrology*: The Proposed Action would have an incremental adverse effect on hydrology on the Chehalis River and tributary streams. This would be considered a minor cumulative effect. *Water Quality:* The Proposed Action would have an negligible, incremental adverse effect on water quality in the Chehalis River. *Floodplains*: The Proposed Action would have a negligible effect on the Chehalis River floodplain.
Vegetation and wetlands	*Vegetation*: The Proposed Action would require the removal of 0.38 acres of riparian forest and 0.75 acres of riparian grasslands	*Vegetation*: The planned Leudinghaus bridge replacement project would require the removal of similar amounts of riparian	*Vegetation*: The Proposed Action would have a negligible, incremental adverse effect on riparian vegetation along the Chehalis

Resource Area	Effects of the Proposed Action	Effects of other past, present, or future actions	Do Effects of the Proposed Action Have an Incremental Effect When Added to the Effects of Other Actions? If so, what is the level of significance of the Proposed Action's effects?
	along the Chehalis River and tributaries. *Wetlands*: The Proposed Action would have no direct effect on wetlands. There would be minor indirect adverse effects through the removal and alteration of adjacent vegetation for construction of the new roadway.	forest and riparian grassland along the Chehalis River and tributaries. It is likely that removal of riparian vegetation will occur on public and private property in the Chehalis River valley in the future. *Wetlands*: The Leudinghaus bridge replacement project is anticipated to have a minor adverse effect on wetlands and adjacent vegetation. Past land use practices in the Chehalis River valley have displaced or degraded wetland habitats.	River and tributaries *Wetlands*: The Proposed Action would have a minor incremental indirect adverse effect on wetlands in the Chehalis River watershed.
Fish and Wildlife	The Proposed Action would contribute to roadkill, human presence, and habitat modification.	Wildlife habitat along the Chehalis River and the many small riparian areas and stream tributaries are currently highly modified by conversion of riparian forests to agriculture and residential properties, and the major transportation corridor of SR 6. Continuing land use practices diminish available fish and wildlife habitat.	Habitat loss as a result of this the Proposed Action is negligible incremental effect when considered in isolation; however, incremental stream loss and riparian habitat loss are expected for several projects associated with the December 2007 floods, including the Leudinghaus bridge replacement project, and repairs to private property and structures along the Chehalis River corridor.
Transportation and Access	The Proposed Action would have a significant beneficial effect on transportation infrastructure in western Lewis County that provides important access between the north and south sides of the Chehalis River. This benefits residents, rural businesses, and forest resource activities on the north side of the river, and improves response times for emergency service provides traveling between SR 6 and the north side of the Chehalis River. The project would have a minor adverse effect	The planned Leudinghaus bridge replacement project would have similar beneficial effects on transportation infrastructure and access overall, and would have similar minor adverse effects on private driveway access along the project corridor roadways.	The Proposed Action would have a significant and beneficial incremental effect on transportation and access when added to other actions, especially the planned Leudinghaus bridge replacement project. This is considered a significant cumulative beneficial effect on transportation and access serving these areas. The Proposed Action would have a minor adverse cumulative effect on private driveway access.

Resource Area	Effects of the Proposed Action	Effects of other past, present, or future actions	Do Effects of the Proposed Action Have an Incremental Effect When Added to the Effects of Other Actions? If so, what is the level of significance of the Proposed Action's effects?
	on access to private driveways along SR 6 and Doty Dryad Road due to the SR 6/Chandler Road intersection being moved closer.		
Environmental Justice	The Proposed Action would have no effect on environmental justice.	The planned Leudinghaus bridge replacement project is not anticipated to have any adverse effects on environmental justice.	The Proposed Action would have no effect on environmental justice, and would therefore not contribute to any cumulative effects of other actions on environmental justice.
Cultural Resources	The Propose Action would have no effect on cultural resources.	The planned Leudinghaus bridge replacement project may have a minor adverse effect on cultural resources. Past land use actions in the Chehalis River valley are likely to have had significant adverse effects on cultural resources.	The Proposed Action would have no effect on cultural resources, and would therefore not contribute to any cumulative effects of other actions on cultural resources.

4.0 Consultation & Coordination

4.1 PUBLIC INVOLVEMENT

4.1.1 SCOPING PROCESS

FEMA sent a scoping letter to agencies, Tribes, and local interested parties on September 1, 2009 (*Section 1.6.1*). The letter provided a description of the proposed project and requested comments on issues and concerns, the range of alternatives, and potential effects regarding the project. The scoping letter and the two letters received are included in Appendix A.

4.1.2 COMMENTS ON THE DRAFT EA

A public notice is required for this draft EA. The public will be provided an opportunity to comment on the draft EA for 30 days after the posting of the public notice. The notice identifies the proposed action, location of the action, participants, location of the draft EA, and who to contact to contribute comments. The public notice will be published in the *East County Journal* and *The Chronicle* on December 16, 2009, and will also be posted at the Chehalis Post Office, Vernetta Smith Chehalis Timberland Library, Doty Fire Hall, Doty General Store, Lewis County Courthouse, and the Lewis County Public Services Building. A copy of the Draft EA will be made available for viewing at the following locations:

1. www.lewiscountywa.gov
2. Board of County Commissioners, Lewis County Courthouse, 351 NW North Street, Chehalis, WA 98532
3. Lewis County Public Services Building, 2025 NE Kresky Avenue, Chehalis, WA 98532
4. http://www.fema.gov/plan/ehp/envdocuments/index.shtm

Written comments on the Draft EA must be submitted to Mark Eberlein, FEMA Region X Environmental Officer, by midnight on January 15, 2010. The initial public notice will also serve as the final public notice. FEMA does not anticipate the need to prepare an Environmental Impact Statement. In the public notice distributed for the Draft EA, all recipients were notified that after the public comment period ends and substantive comments are addressed as appropriate in the final documents, the final EA and the Finding of No Significant Impact (FONSI) will be available for viewing at: http://www.fema.gov/plan/ehp/envdocuments/archives_index.shtm.

4.2 AGENCY AND TRIBAL CONSULTATION AND COORDINATION

FEMA consulted with several federal and local agencies throughout the EA process to gather valuable input and to meet regulatory requirements (see scoping distribution list, Appendix A). This coordination was integrated with the public involvement process.

4.2.1 ENDANGERED SPECIES ACT

There are no federally listed or proposed threatened or endangered species in the project vicinity. FEMA has determined that the Proposed Action will not affect any federally listed or proposed threatened or endangered species and therefore the preparation of a biological assessment is not required by Section 7 of the Endangered Species Act.

4.2.2 NATIONAL HISTORIC PRESERVATION ACT

FEMA sent a copy of the Cultural Resources Report and a letter to the SHPO on December 8, 2009. In the letter FEMA determined that there will be "no historic properties affected" by the Proposed Action and requested that the SHPO concur in, or consult further about, the determination with 14 days. This timeframe was established pursuant to the ongoing FEMA/ Washington Section 106 Programmatic Agreement among FEMA, the SHPO, and the State of Washington Emergency Management Division; executed in accordance with the National Historic Preservation Act.

.

4.2.3 COMPLIANCE WITH EXECUTIVE ORDERS 11990 AND 11988

Executive Orders 11990 and 11988 direct federal agencies to consider the effects of their projects on wetlands and floodplains, respectively. CFR 44 Part 9 sets forth the policy, procedure, and responsibilities to implement and enforce both EO 11990 and EO 11988. Part 9.4 of the CFR defines *Actions Affecting or Affected by Floodplains or Wetlands* to mean actions that have the potential to result in the long- or short-term effects associated with: (1) the occupancy or modification of floodplains, and the direct or indirect support of floodplain development; or (2) the destruction and modification of wetlands and the direct or indirect support of new construction in wetlands. The analysis presented in this EA is intended to meet the intent of the two executive orders and the associated policy, procedures, and responsibilities listed in the CFR. As analyzed in Section 3.3 (*Hydrology, Water Quality, and Floodplains*) and Section 3.4 (*Vegetation and Wetlands*), the Proposed Action would have no significant effects on wetland or floodplain resources in the project area.

4.2.4 TRIBAL COORDINATION

The relationship between federal agencies and sovereign Tribes is defined by several laws and regulations addressing the requirement of federal agencies to notify or consult with Native American groups or otherwise consider their interests when planning and implementing federal undertakings. Among these are the following:

- National Environmental Policy Act
- Section 106, National Historic Preservation Act
- Executive Order 12875, Enhancing the Intergovernmental Partnership
- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations
- Presidential Memorandum: Government-to-Government Relations with Native American Tribal Governments
- Executive Order 13084, Consultation and Coordination with Indian Tribal Governments

FEMA has adhered to these laws and regulations as applicable to the development of the EA. The Confederated Tribes of the Chehalis Reservation (Chehalis Tribe) and Cowlitz Indian Tribe (Cowlitz Tribe) were identified as having an interest in the project area. Efforts have been underway, through the NEPA process, to make a good faith effort in obtaining their comments.

During preliminary coordination, EDAW AECOM contacted the Confederated Tribes of the Chehalis Reservation (Chehalis Tribe) per the direction of FEMA to determine if the Tribe had any questions about or concerns with the proposed project and the archaeological survey being conducted at the time. Brian Ludwig, Ph.D., contacted Mr. Mark White via email on August 13, 2009, and Mr. White informed Mr. Ludwig that the individual to speak with was Mr. Richard Bellon and provided a phone number. Mr. Ludwig called Mr. Bellon on August 14, on August 19, and then on August 24 to inform him of the impending start of the field survey. However, neither Mr. Bellon nor any other member of the Chehalis Tribe contacted EDAW AECOM during this time period.

During the scoping process conducted by FEMA for the Draft EA, the Chehalis Tribe was included in a scoping letter distribution for the project sent by Mark Eberlein, FEMA Regional Environmental Officer, on September 1, 2009 (*Section 1.6.1.* and Appendix A). In addition, a copy of the *Cultural Resources Inventory and Evaluation Report* (Cultural Resource Report) prepared for the project (EDAW AECOM 2009b) was sent to the Chehalis and Cowlitz tribes on December 8, 2009, along with a cover letter from Mark Eberlein requesting comments within 30 days. The report summarizes the potential effects on cultural and historical resources in and around the project site.

5.0 Conservation Measures

The following conservation measures are required as conditions of FEMA funding:

1. The County is required to obtain and comply with all local, state and federal permit and authorization requirements for the Proposed Action. This includes, but is not limited to, compliance with SEPA, the Lewis County Comprehensive Plan, the Lewis County Shoreline Management Program, the Washington State Shoreline Management Act, state and federal Clean Water Acts, and WDFW HPA and USACE permits.

2. The applicant is responsible following all local, state and federal permit requirements for selecting, implementing, monitoring and maintaining Best Management Practices (BMPs). The BMPs would apply to all aspects of construction throughout the project to minimize effects on natural resources, including ground and surface waters. BMPs would include, but not be limited to, the following:

   - Limiting the area of ground disturbance (clearing, grubbing, grading) to the amount necessary for construction of the project;
   - Timing construction activities that expose large areas of soil to occur during the dry summer or early fall months when the threat of erosion due to storm events is minimal; a
   - Implementing a Spill Prevention Countermeasure Control (SPCC) Plan;
   - Implementing a Temporary Erosion and Sediment Control (TESC) Plan both during and after construction of the project; and
   - After construction, revegetating and/or hydroseeding all disturbed areas with an approved seed mixture.

3. The applicant is responsible for complying with all conservation measures included in the Specific Project Information File (SPIF) for the project under the Programmatic Biological Assessment for Washington State, signed on June 29, 2009, between FEMA, the USFWS, and NMFS. These conservation measures include, but are not limited to, timing and material restrictions, specific methods required for on-site activities, BMPs, and requirements regarding the removal, staging and disposal of construction materials or debris.

4. In the event that unrecorded cultural resources are identified during project implementation, all potentially destructive work in the immediate vicinity of a find must cease until a qualified archaeologist can assess the significance of the find and if appropriate, provide recommendations for treatment.

5. As a condition of the grant, should the County propose any change to the approved scope of work for the Undertaking, EMD must notify FEMA as soon as practicable, and FEMA will consult with the SHPO and tribes, as applicable, to ensure compliance with Section 106 of the National Historic Preservation Act (36 CFR Part 800 regulations). As another condition of the grant, if any unexpected discovery of cultural resources occurs during implementation of the Undertaking, EMD will require the County to stop construction activities in the vicinity of the discovery and to avoid or minimize harm to the resource. EMD will notify FEMA as soon as practicable and appropriate steps will be taken.

6.0 Preparers

FEDERAL EMERGENCY MANAGEMENT AGENCY

Mark Eberlein, Regional Environmental Officer
Barbara Gimlin, Environmental Specialist

EDAW AECOM

Jim Keany, Senior Ecologist, Project Manager
Richard Dwerlkotte, Botanist
Linda Howard, Environmental Planner
Amberlynn Pauley, Terrestrial Ecologist
Brian Ludwig, Ph.D., Principal Investigator
Loren Huddleston, Archaeological Technician
Gary Gregg, Archaeological Technician
Tim Kennedy, Archaeological Technician
Sarah Daniels, GIS Specialist
Peter Carr, Editor and Planner

7.0 Distribution

Copies of the Draft EA were sent directly to the recipients below.

FEDERAL AGENCIES

National Oceanic and Atmospheric Administration, National Marine Fisheries Service
Attn: Dan Guy, Southwest Washington Habitat Branch Chief
510 Desmond Drive SE, Suite 103
Lacey, WA 98503

U.S. Fish and Wildlife Service
Attn: John Grettenberger, Division Manager, Consultation Technical Assistance
510 Desmond Drive SE
Lacey, WA 98503

U.S. Army Corps of Engineers Seattle District
Attn: Deborah Johnston, Chief Environmental Resources Section
P.O. Box 3755
4735 East Marginal Way South
Seattle, WA 98124-3755

U.S. Army Corps of Engineers Seattle District
Attn: Jerry Gregory, Biologist
P.O. Box 3755
4735 East Marginal Way South
Seattle, WA 98124-3755

STATE AGENCIES

Washington Department of Fish and Wildlife, Region V
Attn: Dave Howe, Regional Habitat Program Manager
2108 Grand Boulevard
Vancouver, WA 98661

Washington Department of Fish and Wildlife, Region V
Attn: Scott Brummer, Area Habitat Biologist
2108 Grand Boulevard
Vancouver, WA 98661

TRIBAL GOVERNMENTS

Confederated Tribes of the Chehalis Reservation
Attn: Richard Bellon, Cultural Resources
P.O. Box 536
420 Howanut Road
Oakville, WA 98632-8594

Cowlitz Indian Tribe
Attn: dAVE Burlingame, Cultural Resources
P.O. Box 2547
Longview, WA 98632-8594

8.0 References

8.1 DOCUMENTS AND INTERNET CITATIONS

Boyd, R.T. 1998. The Coming of the Spirit of Pestilence: Introduced Diseases and Population Decline Among the Northwest Coast Indians, 1774–1874. University of Washington Press, Seattle, WA.

CEQ (Council on Environmental Quality). 1997. Environmental Justice. Guidance under the National Environmental Policy Act. Available at URL = http://handle.dtic.mil/100.2/ADA434918. Accessed October 28, 2008.

CEQ (Council on Environmental Quality). 2005. Memorandum: Guidance on the Consideration of Past Actions in Cumulative Effects Analysis. Washington, D.C. June 24, 2005.

Chehalis Bee. 1898. Over Lewis County – Dryad. January 21, p. 2.

Chehalis Bee. 1899. Dryad Drift. May 12, p.3.

Chehalis River Council. 2007. Chehalis River Council Website, Hot Topics: General Water Quality summary account (incorporates findings of 1992 Chehalis River Basin Nonpoint Action Plan). Available at URL = http://www.crcwater.org/index.html. Accessed September 15, 2009.

Chehalis Tribe. Website. URL = www.chehalistribe.org. Site accessed September 7th, 2009.

Coffman, N. 1926. Old Lewis County, Oregon Territory: An Address Delivered Before the Southwest Washington Pioneers; August 12, 1926. Copy on file: Fort Vancouver Regional Library, Vancouver, Washington.

USACE (U.S. Army Corps of Engineers). 1990. Flood Summary Chehalis River Basin, January 1990 Event (and Nov. '90 event addendum). U.S. Army Corps of Engineers, Seattle District. Seattle Washington. Available at URL = http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA242755&Location=U2&doc=GetTRDoc.pdf Accessed August 26, 2009.

Costello, M. n.d. Items of Historical Interest From the Doty-Dryad Pe Ell Area from Mrs. Mary Pilz Costello, of the Wenzel Pilz family of Dryad. On file at the Lewis County Historical Museum, Chehalis, WA.

Crowell, L. 2007. A Land Called Lewis – History of Lewis County, Washington. Lewis County Historical Museum, Chehalis, WA.

Daily Chronicle. 1957. Dryad Has Fire Tuesday. June 21, 1957, p. 6.

Ecology (Washington Department of Ecology). 2002. A Water Quality Index for Ecology's Stream Monitoring Program. Publication No. 02-03-052. November 2002.

Ecology. 2005. Stormwater Management Manual for Western Washington (revised 2005). Publication Numbers 05-10-029 through 05-10-033. February 2005. Available: at URL = http://www.ecy.wa.gov/programs/wq/stormwater/manual.html.

Ecology. 2009. River and Stream Water Quality Monitoring. Water Quality Monitoring Station 23A160 - Chehalis R @ Dryad. Available at URL = http://www.ecy.wa.gov/apps/watersheds/riv/station.asp?theyear=&tab=final_data&scrolly=620&showhistoric=true&wria=23&sta=23A160. Accessed: August 21, 2009.

EDAW AECOM. 2009a. Wetland Delineation Report for the Chandler Road Bridge #55 (Dryad Bridge) Replacement Project. Prepared for FEMA Region X and Lewis County Public Works Department. Prepared by EDAW AECOM office in Seattle, Washington. September 2009.

EDAW AECOM. 2009b. Cultural Resources Inventory and Evaluation Report: Leudinghaus and Chandler Road Bridge Replacement Projects, Lewis County, Washington. Prepared for FEMA Region X and Lewis County Public Works Department. Prepared by EDAW AECOM office in Sacramento, California. September 2009.

Environmental Laboratory. 1987. U.S. Army Corps of Engineers Wetland Delineation Manual. Technical Report Y-87-1. U.S. Army Waterways Experiment Station. Vicksburg, Mississippi. 100 pp. + appendices.

Environmental Laboratory. 2008. U.S. Army Corps of Engineers Interim Regional Supplement to the USACE Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region. 154pp.

EPA (U.S. Environmental Protection Agency). 1998. Final Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analysis. April 1998. Available at URL = http://www.epa.gov/oecaerth/resources/policies/ej/ej_guidance_nepa_epa0498.pdf.

EPA (U.S. Environmental Protection Agency). 1999. Consideration of Cumulative Impacts in EPA Review of NEPA Documents. Office of Federal Activities (2252A). EPA 315-R-99-002/May 1999.

FEMA (Federal Emergency Management Agency). 1981. Flood Insurance Rate Map (FIRM), Lewis County, Washington (unincorporated areas). Community Pane Number 530102 0220B. Effective Date December 15, 1981.

Garland, Rodney D., Dennis W. Rondorf, Kenneth F. Tiffan, and Loreley O. Clark. 2001. Subyearling Fall Chinook Salmon Use of Shoreline Riprap Habitats in a Reservoir of the Columbia River. (Ch. 5) *In* (Eds) Kenneth F. Tiffan, Dennis W. Rondorf, William P. Connor,

Howard L. Burge. Post-Release Attributes And Survival Of Hatchery And Natural Fall Chinook Salmon In The Snake River. Report to Bonneville Power Administration, Contract No. 00000161- , Project No. 199102900, 140 electronic pages (BPA Report DOE/BP-00000161-1).

Graves, C. 2008. The History of Pe Ell, Washington. Lewis County Historical Museum, Chehalis, WA.

Hajda, Y. 1990. Southern Coast Salish. In: Northwest Coast. Edited by Wayne Suttles. Pages 503–517. Handbook of North American Indians, Vol. 7. W.C. Sturtevant, general editor, Smithsonian Institution, Washington, D.C.

Halpern, Charles B., and Thomas A. Spies. 1995. Plant Species Diversity in Natural and Managed Forests of the Pacific Northwest. Ecological Applications, Vol. 5, No. 4 (Nov., 1995), pp. 913-934

Hastings, M.C., and A.N. Popper. 2005. Effects of sound on fish. Unpublished report prepared for California Department of Transportation. Available at URL = http://www4.trb.org/trb/crp.nsf/reference/boilerplate/Attachments/$file/EffectsOfSoundOnFish1-28-05(FINAL).pdf. Accessed September 15, 2009.

HHPRI (Harper Hough Peterson Righellis, Inc). 2008. Report of Geotechnical Engineering Services. Lewis County Bridge Replacement Chandler Road Bridge Number 55; Lewis County Road Project Number SM-07F3028. Lewis County Washington. GeoDesign Project: HHPR 48-01.

HHPRI. 2009. Chandler Alternatives Analysis. May 2009.

HHPRI. 2009a. Bridge No. 55 and No. 87 Rehabilitation Project, 100% Review Plan Set. Provided to EDAW AECOM by Lewis County Department of Public Works. August 2009.

HHPRI. 2009b. Bridge No. 55 Rehabilitation Project, 50% Review Plan Sheets – Realigned Chandler Only. Provided to EDAW AECOM by Lewis County Department of Public Works. August 2009.

HHPRI. 2009c. Bridge No. 55 Rehabilitation Project, 90% Review Plan Sheets – Realigned Chandler Only, Grading, Drainage, and Erosion Control. Provided to EDAW AECOM by Lewis County Department of Public Works. September 2009.

HRA (Historical Research Associates, Inc.). 2008. Historic Property Inventory Report – Osborne Residence, Pe Ell, Washington. On file at the Division of Archaeology and Historic Preservation, Olympia, WA.

Hruby, T. 2004. Washington State wetland rating system for western Washington – Revised. Washington State Department of Ecology Publication # 04-06-025. Available online at URL = http://www.ecy.wa.gov/biblio/0406025.pdf.

KGA (Kramer Gehlen Associates). 2008. Project Memorandum to Keith Muggoch, Lewis County Public Works, dated August 12, 2008, presenting the results of the Type, Size, and Location Study for the Chandler Road Bridge No. 55 Replacement project.

Lasmanis, Raymond. 1991. The geology of Washington: Rocks and Minerals. v. 66, no. 4, p. 262-277. Heldref Publications. Washington D.C.

Lewis County. 1999. Lewis County Comprehensive Plan. Approved June 1, 1999; amended April 4, 2002.

Lewis County. 2004. Preliminary Draft Update to the 1994 Comprehensive Flood Hazard Management Plan for Lewis County, Washington. Lewis County Public Works, Chehalis, Washington. May 2004.

Lewis County. 2008a. Lewis County Public Works, Geographic Information Services. Available at URL = http://maps.lewiscountywa.gov/maps/Environmental.html. Accessed: August 18, 2009.

Lewis County. 2008b. Hydrogeological Assessment Doty-Dryad Area, Lewis County, Washington. Prepared for the Lewis County Department of Public Works. Prepared by Aspect Consulting, LLC. Seattle Washington. December 1, 2008.

Lewis County. 2009a. Chandler Road Bridge Construction. Provided to EDAW AECOM by Lewis County Public Works Department.

Lewis County. 2009b. Selected Quantities Tabulation for Permitting. Lewis County Public Works Department. October 24, 2008.

Lewis County. 2009c. Lewis County – Official Zoning Map. Adopted and Ratified by the Board of County Commissioners, April 4, 2002, as amended April 20, 2009.

Lewis County. 2009d. Proposed Right-of-Way Acquisition for the Chandler Road Bridge Replacement Project. Provided to Linda Howard (EDAW AECOM) by Keith Muggoch (Lewis County Public Works) via e-mail September 17, 2009.

Lewis County. 2009e. Lewis County Website; Public Works. Lewis County, Washington. Available at URL = http://lewiscountywa.gov/publicworks. Accessed August 21, 2009.

Map of Lewis County Washington. 1909. On file at the Lewis County Historical Museum, Chehalis, WA.

Massong, T. M., and D. R. Montgomery. 2000. Influence of sediment supply, lithology, and wood debris on the distribution of bedrock and alluvial channels. Geological Society of America Bulletin. v.112. p. 591-599.

Meltzer, C., D. Hicks, and K. Francis. 1987. Fluted Points from the Pacific Northwest. Current Research in the Pleistocene 4:64–67.

NOAA Fisheries (National Oceanic and Atmospheric Administration, National Marine Fisheries Service). 2009. Endangered Species Act Status of West Coast Salmon and Steelhead. Last Updated July 1, 2009. Available online at URL = http://www.nwr.noaa.gov/ESA-Salmon-Listings/upload/snapshot-7-09.pdf. Accessed July 20, 2009.

Northwest Hydraulics (Northwest Hydraulics Consultants, Inc.). 2008. Hydraulic Evaluation Report, Chandler Road Bridge Replacement Project, Chehalis River at Doty. November 2008 DRAFT. Prepared for Harper Houf Peterson Righellis, Inc. and Lewis County Department of Public Works. Seattle, Washington.

Onn, Mrs. Harry Barbara. 1985. Oral History Interview. On file, Lewis County Historical Museum, Chehalis, WA.

Osborne, D. 1956. Evidence of Early Lithics in the Pacific Northwest. Research Studies of the State College of Washington, 24:38-44.

Polk's City Directory – Lewis County. 1907. On file, Lewis County Historical Museum, Chehalis, WA.

Rieman, B.E., and J.D. McIntyre. 1993. Demographic and Habitat Requirements for Conservation of Bull Trout. General Technical Report INT-302. Ogden, Utah: U.S. Forest Service, Intermountain Research Station, 38 pp.

Schaefer, J.M., and M.T. Brown. 1992. Designing and protecting river corridors for wildlife. Rivers. Vol. 3, no. 1, pp. 14-26.

SCS (Soil Conservation Service). 1987. Soil Survey of the Lewis County Area. Robert L. Evans and William R. Fibich, Washington State. 576 pages. Washington D.C.

Tenlen, J. 2006. A Brief History of Lewis County, Washington. Electronic document, available at URL = http://www.drizzle.com/~jtenlen/walewis/history.html. Accessed 9 September 2009.

Theobald, D.M., J.R. Miller, and N.T. Hobbs. 1997. Estimating the cumulative effects of development on wildlife habitat. Landscape and Urban Planning. 39: 25–36.

U.S. Census Bureau. 2004. 2000 Census of Population and Housing. Population and Housing Unit Counts. Washington, DC: U.S. Dept. of Commerce, Economics and Statistics Administration, U.S. Census Bureau. Available at URL = http://www.census.gov/popest/states/asrh/. Accessed August 24, 2009.

U.S. Census Bureau. 2008. Small Area Income and Poverty Estimates for 2007. Available online at URL=online at: http://www.census.gov/did/www/saipe/data/statecounty/data/2007.html.

United States Census Records. 1910. Lewis County – Dryad Precinct.

USFWS (U.S. Fish and Wildlife Service). 2007. Listed and Proposed Endangered and Threatened Species and Critical Habitat; Candidate Species; and Species of Concern in Lewis County, Washington. Last updated November 1, 2007.

USGS (U.S. Geological Survey). 2008. Water-Data Report 2008. Washington Coastal Basin. Upper Chehalis Subbasin. USGS Gage 12020000 Chehalis River near Doty, Washington. U.S. Geological Survey. Available at URL = http://waterdata.usgs.gov/wa/nwis/uv/?station=12020000. Accessed: August 20, 2009.

Waldichuk, M. 1993. Fish habitat and the impact of human activity with particular reference to Pacific Salmon. P. 295-337. In: L.S. Parsons and W. H Lear [eds.]. Perspectives on Canadian Marine Fisheries Management. Canadian Bulletin of Fisheries and Aquatic Science, v 226.

Warrington, D.C. 1992. Vibratory and impact-vibration pile driving equipment. 50p. Originally published in Pile Buck Magazine (www.pilebuck.com); Available at URL = http://www.vulcanhammer.info/vibro/Vibrator.pdf. Accessed September 10, 2009.

WDFW (Washington Department of Fish and Wildlife) 2009a. Priority Habitats and Species Database data for the vicinity of Township 13 North, Range 5 West, Section 12. ESRI shapefile, Washington State Plane South Feet, North American Datum of 1983 (1991 Adjustment – HARN). Updated through August 2009. Information available at URL = http://wdfw.wa.gov/hab/phspage.htm

WDFW. 2009b. Species of Concern in Washington State, last updated June 1, 2009. Includes those species listed as State Endangered, Threatened, Sensitive, or Candidate, and species listed or proposed for listing by the U.S. Fish and Wildlife Service or the National Marine Fisheries Service. Available at URL = http://wdfw.wa.gov/wlm/diversty/soc/soc.htm. Accessed August 24, 2009.

WDNR (Washington Department of Natural Resources). 2006. Hydrography data set for Lewis County. Updated July 2009. Accessed August 4, 2009. Washington State Department of Natural Resources, Forest Practices Division, Olympia WA. Available online at URL = http://fortress.wa.gov/dnr/app1/dataweb/hydrod.html.

WDNR (Washington State Department of Natural Resources). 2008. Digital Geology of Washington State at 1:100,000 Scale, version 2.0. ESRI Shapefile v.9.2 Projection: Lambert Conformal Conic. Coordinate system: Washington State Plane. Zone: South (FIPS 4602). Datum: NAD83 HARN. Available at URL = http://www.dnr.wa.gov/ResearchScience/Topics/GeosciencesData/Pages/gis_data.aspx. Accessed August 24, 2009.

Wells, R.E. 1981. Geologic map of the eastern Willapa Hills, Cowlitz, Lewis, Pacific, and Wahkiakum Counties, Washington: U.S. Geological Survey Open-file Report 81-674, (one oversize sheet with text), scale 1:62,500.

Wilkins, R.N., and N.P. Peterson. 2000. "Factors related to amphibian occurrence and abundance in headwater streams draining second growth Douglas-fir forests in southwestern Washington." Forest Ecology and Management, vol. 139, pgs. 79–91.

WSDOT (Washington State Department of Transportation). 2008. Bridge Design Manual LRFD. Publication No. M 23-50. Bridge Structure Office, Engineering and Regional Operations Division. Olympia, Washington. Last modified May 2008.

7.2 PERSONAL COMMUNICATIONS

Brummer, Scott. 2009. Phone conversation between Barbara Gimlin, FEMA Environmental Specialist, and Scott Brummer, WDFW Region V Habitat Biologist, regarding fish habitat in the project vicinity. December 10, 2009.

Brummer, Scott. 2009. Teleconference between Barbara Gimlin and Tim Snowden, FEMA Environmental Specialists, and Scott Brummer, WDFW Region V Habitat Biologist, regarding fish habitat in the project vicinity. December 11, 2009, and ongoing.

Chan, Jeff. 2009. Phone conversation between Amberlynn Pauley, EDAW AECOM, and Jeff Chan, USFWS, about suitability of habitat and potential for bull trout occupancy in the Upper Chehalis, including the vicinity of river mile 98. August 25, 2009.

Gregory, Jerry. 2009. Telephone voice messages between Barbara Gimlin, FEMA Environmental Specialist, and Jerry Gregory, USACE biologist, regarding USACE permitting requirements. December 10, 2009.

Muggoch, Keith. 2009a. E-mail correspondence from Keith Muggoch, Lewis County Public Works Department, to Linda Howard, EDAW AECOM, Seattle, Washington regarding the development of project alternatives and the description of the preferred alternative.

Muggoch, Keith. 2009b. Telephone conversations between Barbara Gimlin and Tim Snowden, FEMA Environmental Specialists, and Keith Muggoch, Lewis County Public Works Department, regarding construction design and specifications. December 11, 2009.

Muggoch, Keith. 2009b. Telephone conversation between Jim Keany and Linda Howard, EDAW AECOM, and Keith Muggoch, Lewis County Public Works Department. October 16, 2009.

Newell, Colin. 2009. Telephone conversation between Linda Howard, EDAW AECOM, Seattle, Washington, and Colin Newell, WSDOT Chehalis office and volunteer firefighter in western Lewis County, regarding impacts on emergency response in the Doty/Dryad area due to washout of the Chandler Road and Leudinghaus Road bridges across the Chehalis River. September 14, 2009.

Swanson, Craig. 2009. Telephone conversations between Barbara Gimlin, FEMA, and Craig Swanson, Environmental Planner, Lewis County Public Works Department, regarding permit requirements and fish habitat. December 9 and 11, 2009.

Walters, Jody. 2009. Telephone conversations between Tim Snowden, FEMA Environmental Specialist, and Jody Walters, Habitat Biologist, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, regarding Essential Fish Habitat compliance. December 8, 2009, and ongoing.

Appendix A

Correspondence and Consultation

Appendix B

EO 11988 Floodplain Checklist

SEPARATE COMPILED FIGURES